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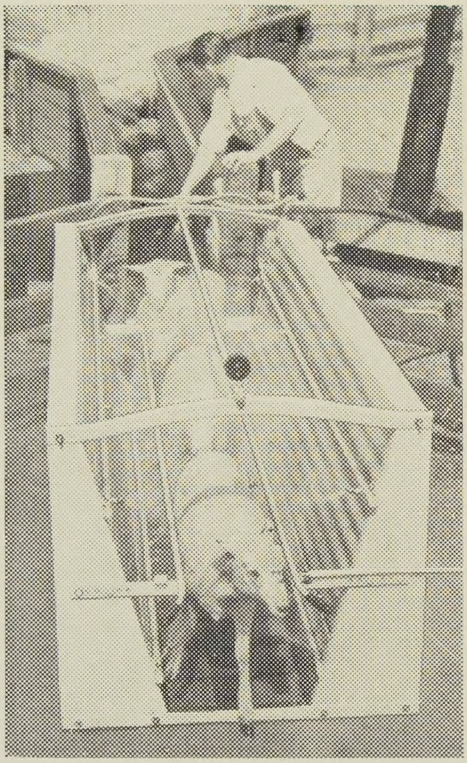

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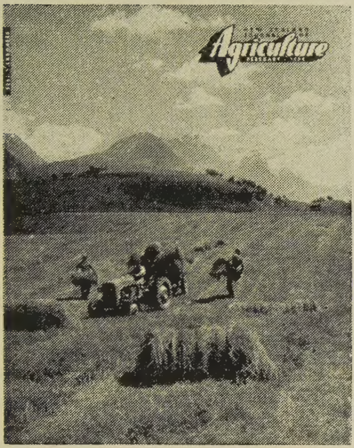

Haymaking at Paradise, Central Otago, near the head of Lake Wakatipu. This area is well known to tourists for its outstanding scenery, and the view on this month's cover looking toward the mountains on the western side of the Dart River emphasises the ruggedness of the country. Sheep and cattle are run in the district and the severe winters compel farmers to save as much pasture as possible for feeding out to stock, especially when snow lies on the ground. Photograph by R. V. Francis Smith.

TABLE OF CONTENTS

Sprinkler Irrigation of Pastures in the North Island	H. G. Hopewell	106
Meteorological Records for December	..	110
Mediterranean Mustard, a New and Potentially Troublesome Weed in New Zealand	A. J. Healy	111
The Home Orchard in Autumn	S. P. Money	115
Getting Ready for New Pullets in Household Poultry Unit	..	119
Dairy Produce Graded for Export	..	120
Overdrilling of Pastures and Crops	L. W. Blackmore	121
Care of Livestock during March	..	130
Pasture Production (Seasonal Notes)	..	131
Recent Research Work: Residual Effects of Weedkillers	..	132
Beekeeper's Saw Bench	C. R. Paterson and A. W. Bennett	133
Lambing Estimates for 1957 season	..	149
Domestic Beekeeping	A. W. Bennett	151
Pedigree Pig Improvement Scheme	A. Longwill	155
Economic Comparisons of Farm Improvement Groups	R. H. Scott	161
Radio Broadcasts	..	165
Seed Production in New Zealand: Montgomery Red Clover	J. D. Wraight	166
Show Dates	..	176
Maintenance of Health in Ewe Flock	J. C. Gerring	177
The Home Garden	A. G. Kennelly	181
Water Hyacinth Reproduces by Seed in New Zealand	J. G. Manson and B. E. Manson	191
Omelettes	Maud B. Strain	192
White Moire Ribbon Waistcoat, Hat, and Bag	..	197
Simnel Cake	Christine Lyons	198
The Flower Garden	J. S. Say and Rosalie A. Campion	199

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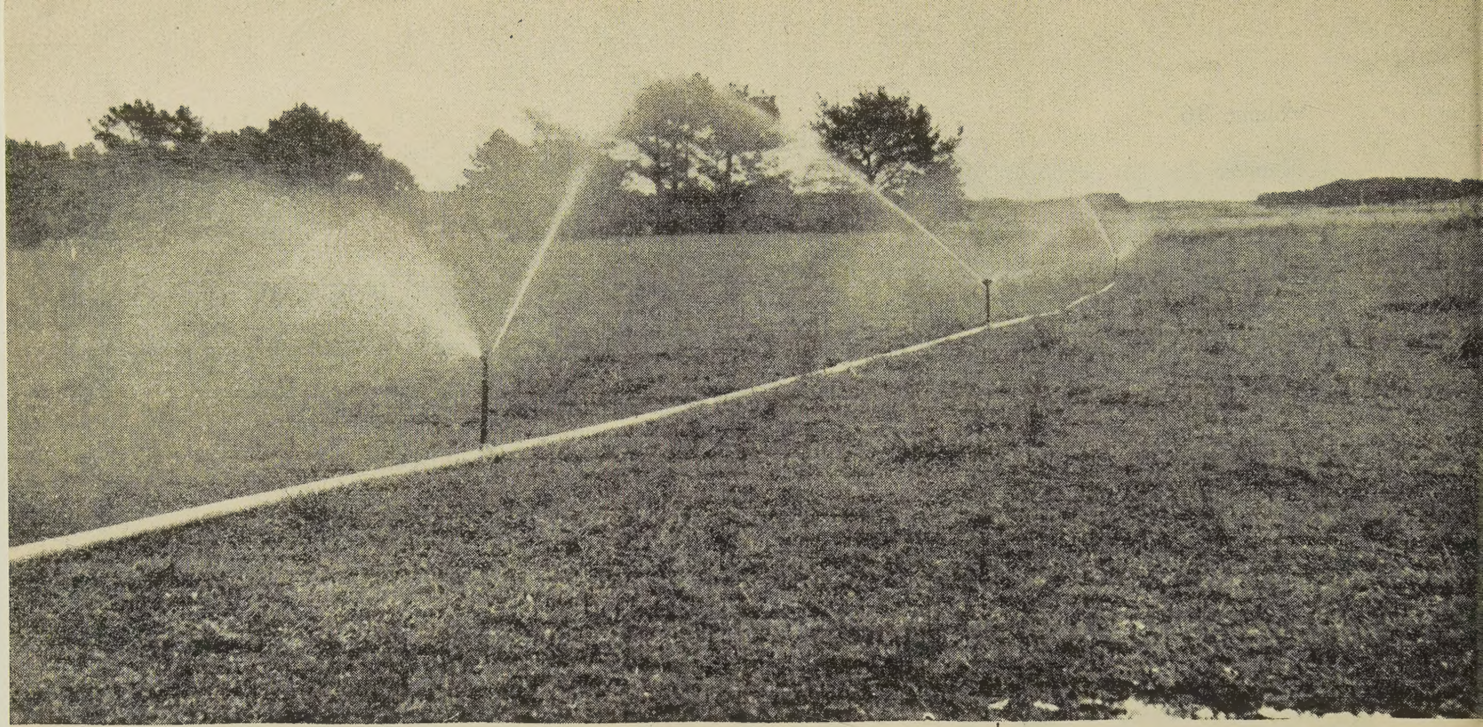


A medium-pressure sprinkler irrigation plant on a dairy farm.

Sprinkler Irrigation of Pastures in the North Island

PASTURE irrigation research has been going on at the Department of Agriculture's Rukuhia Soil Research Station, near Hamilton, for some years. In this article recommendations based on the results to date are made by H. G. Hopewell, Senior Scientific Officer, who is at present in charge of this work.

IT is now about 10 years since the possibility of using sprinkler irrigation on pasture lands in the North Island was first given serious consideration by practical farmers. A few enthusiasts had been flood irrigating pasture for many years before this, but it was not until about 1947 that the first spray irrigation schemes began to appear on farms.

That there should have been critics—often vociferous ones—can readily be understood when one realises that irrigation was being suggested in all seriousness in a climate already blessed with an annual rainfall of 40in. to 50in. which was reasonably well distributed.

However, a few farmers and commercial firms were so convinced that irrigation would be feasible that they persevered with their efforts in spite of the criticism and the technical difficulties. The fact that today there are estimated to be 600 to 700 plants operating in the North Island seems to justify their confidence.

As was to be expected considerable progress has been made over the past decade. Improvements have been brought about in the type of equipment available, particularly in reducing the labour required in its operation. Experience has been gained concerning the problems of operating the equipment in the field and the benefits likely to be derived from irrigation. As a result a more reliable opinion now can be formed about the conditions under which sprinkler irrigation is likely or unlikely to be worth while. In short, spray irrigation has passed from being a rich man's plaything to the stage where it can, in the right circumstances, be a very valuable tool for further increasing farm production.

Research Programme

Side by side with all this development a programme of irrigation research has been going ahead steadily at the Rukuhia Soil Research Station. This work was begun when spray irrigation was first tried in the Waikato and was due in large measure to the enthusiasm of Dr. H. E. Annett, who is well known as a research worker and practical farmer.

The general object of research work has been to determine the moisture requirements of pastures and the type and management of pastures most suitable where irrigation is practised. Valuable information has been gained, though much still remains to be learnt.

Before discussing the more practical aspects of this subject, it is necessary to consider briefly certain fundamental soil-water concepts.

Field Capacity

If a soil is thoroughly wetted, the excess water will drain away under the force of gravity and in one to two days there will be left in the soil only as much water as the soil can hold against this force. The soil is then said to be in a state of field capacity. The amount of water so held will vary from one soil type to another, depending on the texture. Generally the heavier the soil is the more water it will hold.

Once field capacity is reached there will be a gradual loss of water from the soil unless rain falls. Some will be absorbed by the plant roots and transpired through the leaves and some will be lost by direct evaporation from the soil surface. The sum of these two is called evapotranspiration.

Wilting Point

When the soil is at or near field capacity the water is very loosely held, but as the soil dries out the remaining moisture becomes more and more tightly held by the soil particles and the plant roots find increasing difficulty in absorbing it. Finally the stage is reached when the attraction of the soil particles for the water is greater than the force the plant roots can exert. The plant can then no longer get sufficient moisture and it wilts and growth stops.

If this condition continues, the plant will die. The soil-moisture status is said to be at wilting point when permanent wilting of the plant occurs.

Available Water

The water in the soil which is available to plants is that from just above field capacity to just above wilting point. Generally the heavier the soil is the greater will be the amount of water available. There are, however, a few exceptions. Owing to their nature some heavy soils hold very little more water than do some light ones.

The amount of available water as defined above is often expressed as the depth of water present in the top foot of soil. Table 1 gives average figures for three broad soil classifications.

It is important to appreciate that a free-draining soil cannot be wetted, except very temporarily, to a degree greater than field capacity. For example, reference to Table 1 shows that 1in. of water will re-wet a dry, sandy soil to a depth of 1ft. The application of 2in. will not wet this foot to a greater extent, but will merely wet twice the depth; that is, about 2ft. to the same degree.

Water in excess of that necessary to re-wet the soil must be regarded as wasted. This can be important where the water supply is limited or pumping costs are high.

TABLE 1—WATER-HOLDING CAPACITY OF THREE TYPES OF SOIL

Soil type	Amount held at field capacity in.	Per foot depth of soil Amount held at wilting point in.	Available water in.
Light, sandy soil	1.25	0.25	1.00
Medium loam	2.25	0.50	1.75
Heavy loam	3.65	1.30	2.35

Infiltration Rates

The rate at which water will move into a soil (infiltrate) and through a soil (permeate) is determined by a number of factors, the most important of which is the texture of the soil. Heavy soils with a predominance of fine particles have low infiltration rates and permeabilities. The structure of the soil is also important. A soil in good heart will have a higher rate than one originally similar but in which structure has been destroyed by cropping or through poaching by stock trampling.

The moisture content of the soil, the presence of a relatively impervious subsoil layer, and the nature of the vegetative cover also affect the position.

There is, obviously, an upper limit to the rate at which water can be applied (precipitation rate) if excessive surface run-off is to be obviated. Table 2 sets out the permissible precipitation rates on three general soil types. This is to be taken only as a guide.

TABLE 2—RECOMMENDED PRECIPITATION RATES*

Type of soil	In. per hour	Hours to apply 1in.
Light, sandy soil	¾ to 1½	⅔ to 1⅓
Medium loam ..	½ to ¾	1⅓ to 2
Heavy loam ..	1/5 to ½	2 to 5

* On sloping land rates must be reduced.

Moisture Requirements of Pasture

Though there is still some argument among research workers, it is now generally agreed that the nearer the soil is maintained to field capacity the better is the growth.

It is, of course, impossible to maintain the soil at any given moisture status. It can be wetted only to field capacity. However, this can be done more or less frequently, with the result that the soil is at or near field capacity for a greater or smaller proportion of the time.

Once the soil is wetted losses occur through evapotranspiration, which ultimately reduces the moisture status to wilting point. Before this happens it is necessary to irrigate.

If the rate of loss could be determined and if it were known how much loss could occur before growth was seriously affected, there would be a logical basis for planning the irrigation schedule. Considerable progress has been made with this approach.

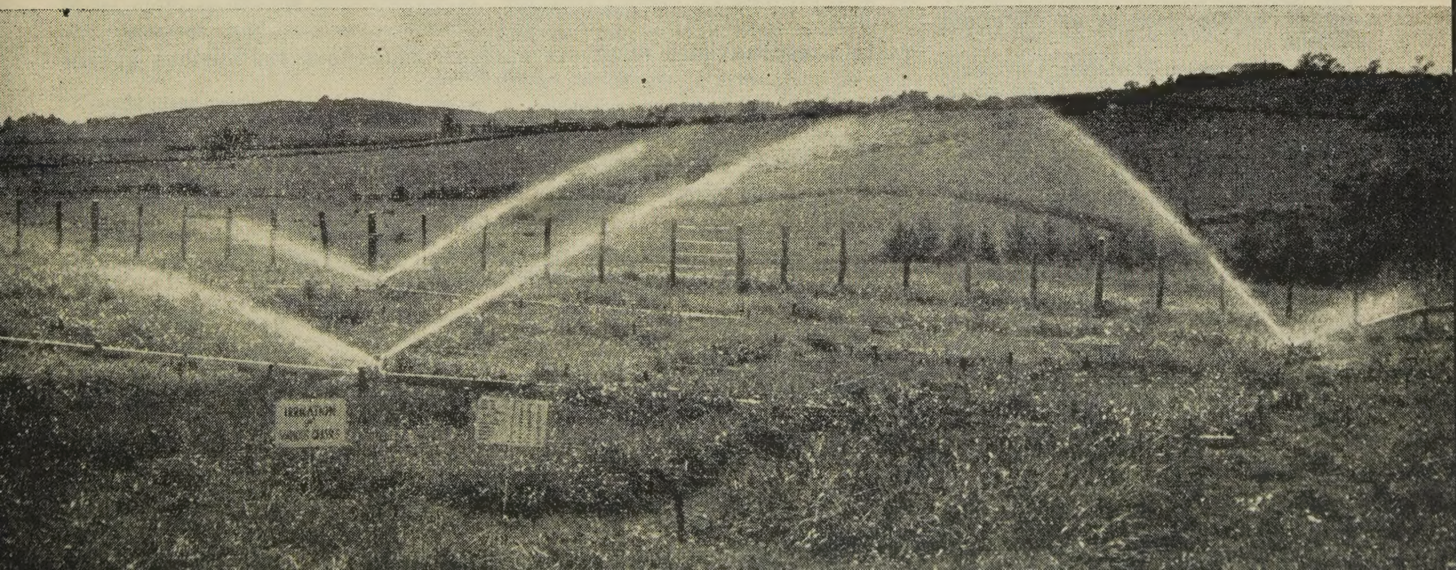
Working at Rothamsted Experimental Station in England, Dr. H. L. Penman, a soil physicist, has shown that it is possible to calculate the rate of loss by evapotranspiration from a soil covered with an actively growing pasture. This implies an adequate supply of moisture, a condition which obtains under irrigation. Penman shows that the rate of loss is largely determined by the prevailing climatic conditions and that it is related to the loss from an open water surface.

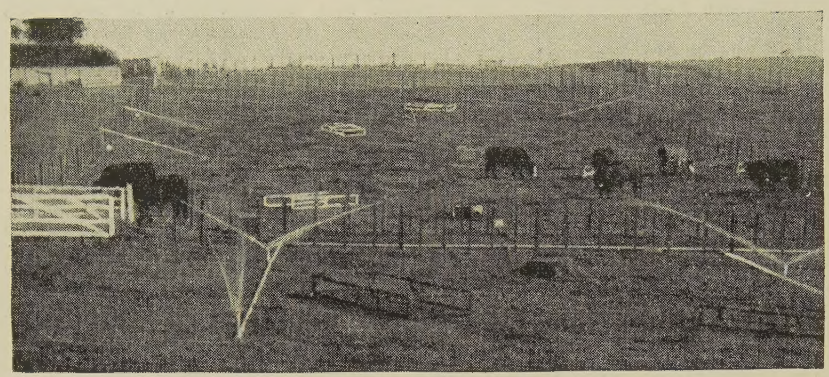
Based on his work, the average daily losses under Waikato conditions have been shown to be:—

	In.
November	0.12
December	0.13
January	0.15
February	0.13
March	0.10

Over a short period actual losses can exceed the average quite appreciably. Losses of 0.25in. and more per day have been recorded under exceptional conditions in January. Nevertheless the average figures can serve as a satisfactory basis for determining irrigation requirements. The errors involved in their calculation are probably less than those involved in the determination by the farmer of the amount of water applied.

In this trial the growth of various pasture species under irrigation is being studied in small plots.





For many investigations of sprinkler irrigation small paddocks under cattle grazing are used.

Amount of Water Required

The importance of applying sufficient water is shown in data obtained in 1956-57 from an experiment at Rukuhia.

In the first treatment (A) 100 per cent. of the water estimated to have been lost was replaced, in the second (B) 75 per cent. was replaced, and in the third (C) no irrigation was applied. No effective rain fell from 7 January to 8 March.

For 3 weeks after the onset of the dry spell there was no difference in pasture production between A and B, but the production from C had fallen to 50 per cent. of that from A. During the remainder of the dry spell, which lasted another 5 weeks, pasture production fell markedly on the areas receiving insufficient water; B produced only 55 per cent. of that from A. There was no measurable production on the non-irrigated plots.

Frequency of Irrigation

It now remains to decide how much loss can occur before growth is affected seriously. Though experiments have shown that the more frequently irrigation is applied the better is the growth, the farmer is concerned rather with how long he can continue without irrigation before growth is depressed to an important extent.

Experiments on Hamilton clay loam show that this happens after about 1in. to 1½in. is lost or, as it is often expressed, when a deficit of 1in. to 1½in. is built up. This means that ideally under average conditions 1in. or 1½in. should be applied at the following intervals:—

	1in.	1½in.
November ..	9 days	13 days
December ..	8 days	12 days
January ..	7 days	10 days
February ..	8 days	12 days
March ..	10 days	15 days

It should be emphasised that the amount stated is that required in the soil as opposed to the amount the irrigator might **think** is going there. This point will be referred to again later.

The above information was gained on Hamilton clay loam. Similar results have been obtained on Horotiu sandy loam. No experiments have yet been conducted by Rukuhia on lighter sandy soils. It is considered, however, that the same total amount of water will be required, but that more frequent irrigations (with smaller amounts per application) will be necessary.

Three alternatives are possible in planning the irrigation schedule:—

1. Fixed amounts of water can be applied at fixed intervals throughout the season. This fails to take account of the variation in water requirement over the irrigation period. An amount of water that is sufficient for the needs of the pasture in January is excessive in the other months. This approach can be recommended only where the greatest possible simplification of irrigation routine is necessary.

2. Fixed amounts of water can be applied at each irrigation and the interval between irrigations varied according to the rate of water use. This approach is considered the best in so far as it provides for making good the loss of moisture as soon as this has reached the stage where it begins to affect growth. Table 3 gives recommendations where this approach is to be adopted.

3. It is probably more convenient for the farmer to irrigate at fixed intervals and vary the amount applied at each irrigation according to the water used in the period since the last irrigation. This means that in periods of high water demand the deficit built up in the interval will be such that growth will be affected. However, it is the procedure most likely to be adopted, and recommendations for it are given in Table 4.

In the recommendations given no account has been taken of natural rainfall. This can be allowed for in two ways:—

(i) The irrigation schedule can proceed and the amount applied can be reduced by the amount of rain recorded.

(ii) The irrigation schedule can be delayed. In this case a delay of 1 day for each 0.2in. of rain recorded is recommended. This alternative is preferable to (i), as it involves less labour. In either case it is suggested that daily falls of less than 0.2in. be disregarded.

It is important for farmers to keep a rain gauge. A simple type is not expensive and it is easy to install and read. Records given in the local newspaper are often taken a considerable distance away and can be very misleading.

Evaporation Losses

It should be emphasised again that the amounts of water recommended are those needed in the soil, not the amount that the irrigator **thinks** that he is putting there.

Considerable losses occur from the spray in the air and from droplets on the ground. Overseas workers quote losses up to 40 per cent. under hot, arid conditions. Loss in the Waikato might well be 10 per cent. Irrigation at night will largely eliminate this loss.

A further point is that the amount of water being applied is often based

TABLE 3—RECOMMENDED INTERVALS BETWEEN IRRIGATIONS FOR VARIOUS MONTHS AND SOILS

	No. of days between applications				
	Nov.	Dec.	Jan.	Feb.	Mar.
Heavy soil: Apply 1½in. to 2in. at each irrigation ..	13	12	*10	12	15
Medium loam: Apply 1in. to 1½in. at each irrigation	9	8	*7	8	10
Light sandy loam: Apply ¾in. to 1in. at each irrigation	8	7	*5 to 6	7	8

* In a hot, dry period in January the irrigation interval should be reduced by 1 day.

TABLE 4—RECOMMENDED AMOUNTS OF WATER PER APPLICATION AT FIXED INTERVALS FOR VARIOUS MONTHS ON THREE TYPES OF SOIL

	*Amount of water per application				
	Nov.	Dec.	Jan.	Feb.	Mar.
	in.	in.	in.	in.	in.
Heavy soil: Irrigation at 10-day intervals ..	1¼	1½	1¾	1½	1¼
Medium loam: Irrigation at 7-day intervals ..	¾ to 1	1	1¼	1	¾ to 1
Light, sandy loam: Irrigation at 5-day intervals	¾	¾	1	¾	¾

* In particularly hot, dry periods apply 10 per cent. more water.

Irrigated pastures should be ration grazed with an electric fence.

on the supposed pump capacity and the area being irrigated. The writer's observations suggest that this approach may give an inaccurate figure. A simple check can be made by collecting a dozen or so parallel-sided tins, placing them strategically between two spray lines, and measuring the depth of water in them with a ruler. The average depth of water in the tins gives a reasonable check on the amount being applied and also the distribution pattern.

Starting Irrigation

A start with irrigation is often delayed too long, with the result that growth almost ceases and to stimulate it again, even after the water is applied, takes some time.

Examination of rainfall records at Hamilton reveals that irrigation is seldom warranted before November. On the other hand only in exceptional seasons can it be delayed until after Christmas.

From October onward the position should be watched. About 7 or 8 days with no appreciable rain and none forecast will mean that irrigation should begin.

Where the initial irrigation has to be delayed because of harvesting or other urgent farm work additional water should be applied at the first irrigation. This should be sufficient to make good the deficit which has accumulated; that is, the soil profile should be thoroughly wetted to a depth of 12in. or more.

Uniformity of Distribution

Extensive research in America has revealed that rotating sprinklers apply water more heavily near the sprinkler than further from it. To overcome this it is necessary to space the sprinklers so that the circles wetted overlap.

American workers concluded that the sprinklers should be spaced at a distance apart equal to 60 per cent. of the diameter of the circle wetted; for example, if the sprinkler throws 40ft., the diameter of the circle wetted will be 80ft., and 60 per cent. of this is 48ft. Since most pipes are 20ft. long, the spacing adopted will be 40ft. However, the area lying centrally between four sprinklers still tends to receive less water, and to overcome this it is suggested that the successive positions of the spray heads and spray lines be alternated if possible. This will at least even up the distribution over the season, and normally no additional labour will be involved.

Time of Water Application in Relation to Time of Grazing

Dr. K. J. Mitchell, of Grasslands Division, Department of Scientific and Industrial Research, Palmerston North, has focused attention on the fact that high summer temperatures can be an important factor limiting grass production. Of particular importance are the temperature and humidity in and just above the surface of the soil. When the pasture is eaten off and the cover removed, the humidity drops and surface soil temperatures rise in this zone, conditions known to induce a serious check to growth. One important effect of irrigation may be that it minimises these effects.

Though there is no precise evidence on the point, it is suggested, on what seem to be sound grounds, that irrigation should follow immediately after grazing. In practice it may be difficult to arrange the irrigation and grazing schedules in this way, but, where possible, this routine is recommended.

Pastures for Irrigation

Research work on what type of pasture should be irrigated has progressed a limited distance.

Under Waikato conditions the ryegrasses, particularly the older strains of short-rotation ryegrass, have been found to be incapable of high production, even under adequate irrigation. However, because white clover flourishes under irrigation, it takes up the running, so that a good ryegrass-white clover sward will give a high level of production.

Cocksfoot has responded well and, given proper management, it has been found possible to maintain a good grass : clover balance in the sward.

Paspalum has given high yields, which suggests that it could be used in areas where it grows well. However, it suffers from the disadvantage that it produces practically nothing outside the irrigation period. This limits its use to places where it can be combined successfully with ryegrass and white clover.

It is important, therefore, that pasture selected for irrigation should be capable of high production and should include cocksfoot as a major species. Paspalum can be used under the conditions outlined.

Fertiliser Requirements of Irrigated Pastures

The question of whether irrigated pastures need additional fertiliser is often raised. Only limited experimental work has yet been done, but the following comments are offered as a guide.

Experiments on an area of Hamilton clay loam which had been adequately topdressed showed no response to heavier than normal annual dressings of phosphate. Whether dividing the annual applications into two dressings, one applied in autumn and one in spring, would be an advantage is not known, but it is possible that it would.

Spring applications of nitrogen failed to give a response. The effect of the addition of nitrogen to the irrigation water is being studied in a trial started just before last summer. Sulphate of ammonia at ¼cwt. per acre was applied with each irrigation, the total for the season being 2½cwt. per acre. No response was observed in the first season.

One special case needs careful attention, however. Where grazing is on the "on and off" principle there must inevitably be a transfer of fertility, since the stock will tend to go on empty and come off full. This loss will tend to be cumulative over the years if, as is usual, the same area is irrigated each season. The loss must obviously be made good. The quantities of additional fertiliser required are difficult to assess.

Over 8 years the average production from irrigated pastures in trials at Rukuhia from the beginning of November to the end of March was about 6000lb. of dry matter per acre. If it is assumed that a third to a half of this was removed, the loss of nutrients annually would be:—

	Equivalent of
Potash ..	1cwt. to 1½cwt. of muriate of potash
Phosphate ..	1cwt. of superphosphate
Nitrogen ..	4cwt. of sulphate of ammonia

The nitrogen lost may be made good through white clover, which flourishes under irrigation, but the other nutrients must become depleted eventually. The rapidity with which the effects will become evident will depend on the initial fertility of the area.

Further investigations concerning this aspect are in progress, but meantime the following suggestions are made:—

Where there is no transfer of fertility no fertiliser additional to that normally applied as an annual dressing will be required. The splitting of the annual dressing so that half is applied in autumn and half in spring could be considered.

Under the on and off system of grazing, where an appreciable transfer of fertility seems to be occurring, the application of additional fertiliser is suggested. This can be at the expense of the remainder of the farm and should be about 1cwt. per acre of superphosphate per annum and 1cwt. per acre of muriate of potash per annum in addition to the normal dressing.

Management of Irrigated Pastures

One of the weaknesses of irrigation as practised at present is inefficient management of the pastures. Too often cows are permitted to graze the irrigated paddocks almost continuously. Yet it is an axiom of good pasture management that to grow grass it must be spelled. That this is true of irrigated pastures is shown by a trial at Rukuhia where spelling for 20-day as opposed to 10-day intervals has increased the yield about 40 per cent.

Another aspect of this trial has shown the importance of maintaining a cover of grass by grazing leniently, especially in the hotter months.

In view of the cost of producing grass under irrigation every attempt must be made to get maximum yield and utilisation, as otherwise there can be little hope that this method of providing summer fodder will be economic.

Two methods of feeding irrigated pasture will be possible:—

1. Where ample irrigated pasture is available it will provide the full diet of the cows.

2. More commonly the area irrigated will not be sufficient for this and the irrigated pasture will be regarded as a milking supplement.

In either case it should be used in the same way: Fed off in breaks, spelled adequately, and not grazed too hard. Where it is used to supplement the normal pasture, care should be taken to see that a consistent ration is available.

The use of harrows to spread dung is desirable.

Summary of Recommendations

To obtain the optimum response from irrigation it is essential to:—

1. Irrigate pastures capable of high summer production. Cocksfoot should be included in the sward in the cooler areas and paspalum in the warmer ones.
2. Maintain a high level of fertility through the appropriate use of fertilisers.
3. Manage the pastures properly. It is essential to graze leniently, particularly in the hotter months, and to allow adequate spells between grazings.
4. Use the herbage grown efficiently. It should be rationed carefully in the same way as autumn-saved pasture by use of the electric fence.
5. Begin irrigation early. Be prepared to start at any time from October onward.
6. Apply adequate amounts of water at sufficiently frequent intervals.

◆

Meteorological Records for December

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	62.2	— 0.5	80.2	40.6	2.17	11	— 1.68	0.59	12	229
Auckland	160	61.8	— 1.9	77.1	49.3	1.84	17	— 1.09	0.41	4	221
Tauranga	8	61.8	— 0.3	78.1	40.8	1.51	7	— 2.02	0.59	5	241
Ruakura	131	58.8	— 1.9	77.8	37.4	2.71	15	— 0.37	0.90	17	226
Whakarewarewa ..	1006	58.6	— 1.6	73.8	38.8	2.40	11	— 1.76	0.56	14	223
Gisborne	14	64.1	+ 1.4	87.4	39.0	0.33	7	— 1.58	0.09	6	270
New Plymouth ..	160	58.1	— 1.9	67.1	42.0	7.94	18	+ 3.35	1.72	14	190
Kariol	2125	54.0	— 1.2	70.4	33.2	7.00	21	+ 3.09	2.77	14	
Napier	5	64.8	+ 1.6	88.0	43.0	1.20	9	— 0.78	0.46	15	252
Wanganui	72	59.2	— 2.2	75.7	45.8	5.15	16	+ 2.29	1.39	14	224
Palmerston North ..	110	58.8	— 1.6	74.0	42.0	5.72	20	+ 2.44	1.55	14	174
Waingawa	340	59.0	— 1.2	77.6	36.0	1.95	21	— 0.56	0.53	27	211
Wellington	415	56.7	— 2.4	68.3	44.9	4.31	14	+ 0.85	0.89	11	187
Nelson airfield ..	5	58.4	— 1.0	73.0	39.0	2.15	13	— 0.69	0.61	17	214
Blenheim	12	59.2	— 1.6	77.5	36.4	2.74	13	+ 0.74	0.83	13	210
Hokitika	15	53.8	— 2.3	63.9	40.2	17.60	26	+ 7.64	3.15	17	156
Hanmer	1270	55.2	— 2.6	80.5	33.0	4.75	13	+ 1.04	0.98	7	193
Christchurch ..	22	59.2	— 0.6	84.1	37.9	2.76	14	+ 0.22	0.57	18	214
Ashburton	323	58.9	— 0.2	84.4	34.2	3.61	11	+ 0.60	0.82	21	194
Timaru	56	57.8	— 0.9	86.3	38.4	4.41	15	+ 1.75	1.53	17	190
Alexandra	520	57.4	— 2.8	80.0	35.2	1.35	10	+ 0.05	0.37	13	204
Taieri	80	55.5	— 0.5	80.1	35.1	2.77	19	+ 0.21	0.54	17	143
Invercargill airfield ..	0	53.1	— 1.9	74.8	34.3	3.25	22	— 0.35	0.50	5	178
Chatham Islands ..	140	55.0	+ 0.0	66.3	40.1	2.91	15	+ 0.62	0.63	8	

Mediterranean Mustard, a New and Potentially Troublesome Weed in New Zealand

By A. J. HEALY,
Botany Division, Department of Scientific and Industrial Research, Christchurch

SEVERAL plants of Mediterranean mustard (*Brassica tourneforti* Gouan) were found in October 1956 on waste land at Timaru, their origin possibly being from seed accidentally introduced in Australian grain handled at the port. Because of the significance of this plant as a weed in cereal crops overseas attention is drawn to its appearance in New Zealand so that a close watch can be kept for any further occurrences and eradication measures adopted. The plants on which the identification was based were destroyed after specimens for record purposes were secured and the site will be examined this season so that any further plants can be eradicated.

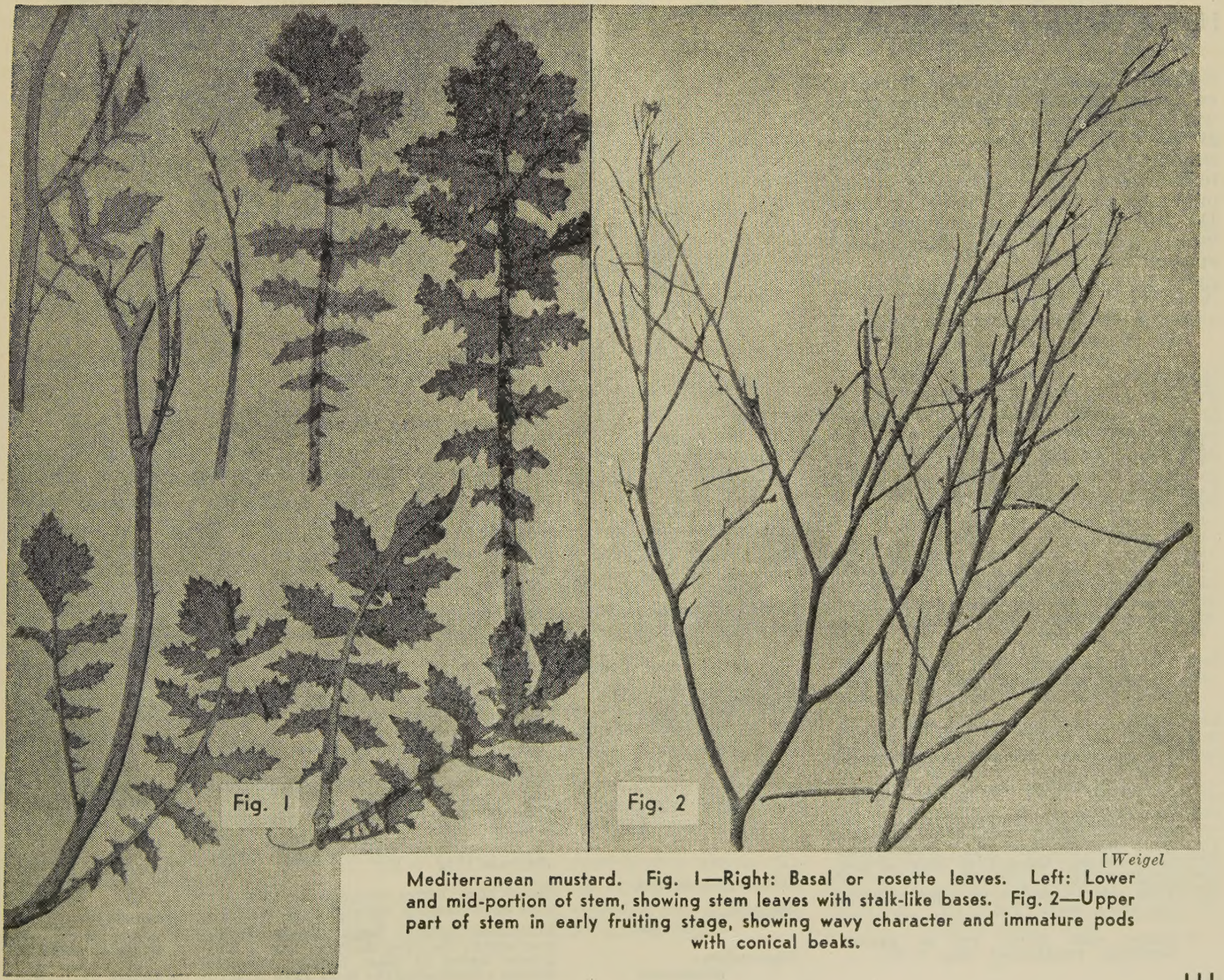
A NATIVE of the Mediterranean region, this species has been accidentally introduced to other countries, where it has established and proved troublesome.

The weed appeared in Western Australia about 1914, but was not recognised as distinct from other weed mustards until 1928, by which time it was very aggressive, and in 1929 it was gazetted as a noxious weed in the State. According to Currie (1936) this species was then ". . . the most important weed pest of West Australian wheat fields".

It was thought to have come into South Australia about 1928, and according to Clarke (1939) it was widespread and aggressive, and by 1948 it was estimated that over 100,000 acres were infested.

In Victoria the weed spread rapidly through the Mallee and was gazetted a noxious weed for the State in 1934, though according to Sims (1945) it was not until 1936 that it became really serious.

The weed was recorded from California, U.S.A., by Fleischman (1949), who states that it first appeared as a roadside weed in the Coachella Valley in 1938 and that by 1944 it had spread many miles along the sides of the highway. At the same time Californian farmers were warned to recognise the weed and take control measures.



[Weigel

Mediterranean mustard. Fig. 1—Right: Basal or rosette leaves. Left: Lower and mid-portion of stem, showing stem leaves with stalk-like bases. Fig. 2—Upper part of stem in early fruiting stage, showing wavy character and immature pods with conical beaks.

Description

An erect, hairy annual, the weed is 6in. to 6ft. high, with a long taproot and distinct turnip smell.

The stems are erect, round in cross-section, branching, wavy, bristly-hairy below, and more or less hairless above.

The basal leaves form a rosette 1ft. to 2½ft. in diameter, are stalked, with 4 to 12 lateral segments (Fig. 1) and a large terminal segment often more or less three lobed; the lateral segments decrease in size toward the base of the leaf.

The stem leaves are few and much smaller than the rosette leaves.

The heads are many flowered, lengthening in fruit.

The flowers are pale yellow and small.

The seed pods or fruits are on stalks about ½in. long, the pod 1½in. to 2½in. long, containing 10 to 22 seeds. The pod has a long conical beak about a third the length of the pod proper, and carries 1 or 2 seeds near its base (Fig. 2). The seeds are small, globular, and pale purple-brown.

How to Distinguish from Related Weeds

Mediterranean mustard is liable to be confused with related cruciferous weeds already present in New Zealand; all have yellow flowers, a somewhat similar general aspect, and several a tumbleweed nature. Species which might be confused are listed on page 113 and a key which enables these weed species to be differentiated appears below.

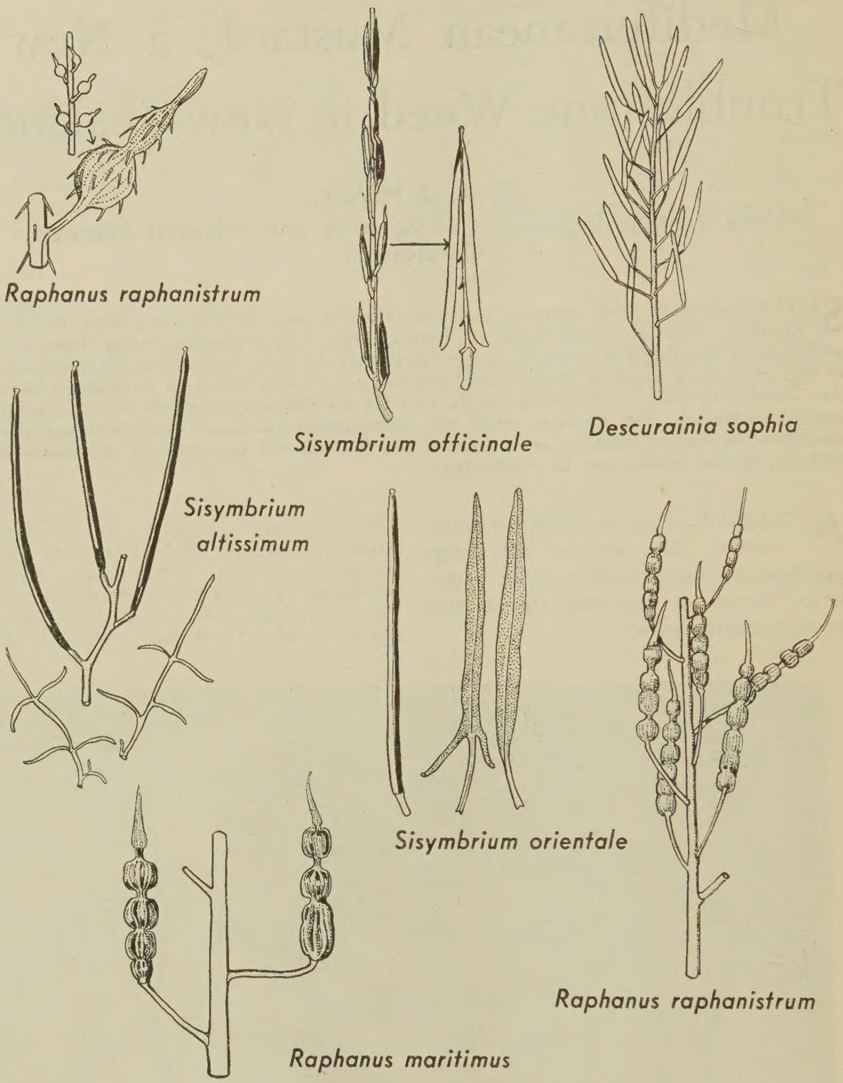


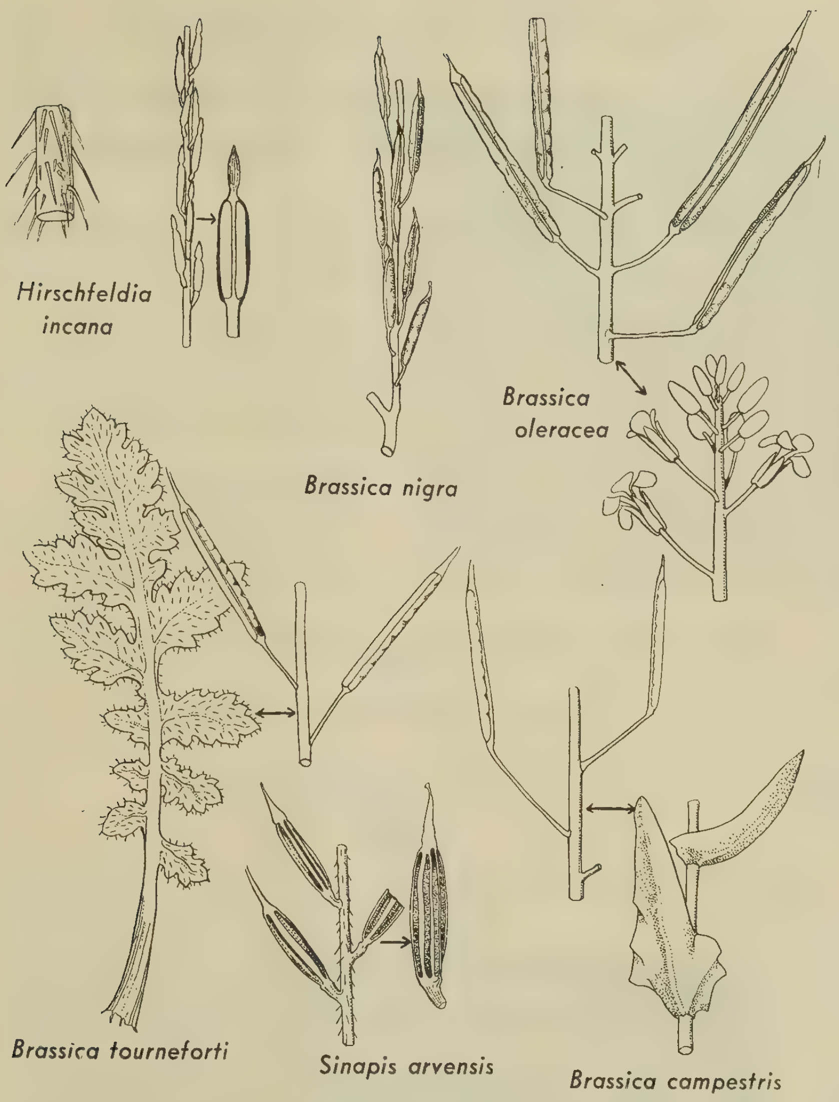
Fig. 3—Mediterranean mustard → **and related species with which it might be confused.**

KEY TO DISTINGUISH WILD MUSTARDS

A representative weed specimen is taken and the pods checked against the first option or statement under 1 below; if it does not agree with the first option, it is checked against the second option under 1, with which it agrees: pass then to 2 as directed by the number on the right-hand side. Check the first option under 2; the pods agree with the first option under this number, so pass on to 3; check against the first option of 3, and, as it agrees, pass to 4; check the first option of 4, and, since the specimen has "pods spreading from stem" and "stalk of pod very slender and ⅓ as long as pod", the plant is *Descurainia sophia* as given on the right-hand side opposite this option.

Any yellow-flowered mustard weed can be identified by working it through the key in this fashion, the drawings of the pods being used in conjunction.

1.	Pod short, upper half globe shaped, bristly, much wider than lower half (Fig. 3 A)	*Raphanistrum rugosum*
	Pod short or long, upper half not globe shaped	 2
2.	Pod lacking distinct conical beak (Fig. 3 B, D)	 3
	Pod with distinct conical beak (Fig. 3 L, K)	 6
3.	Pods ⅓in. to 1in. long	 4
	Pods 2in. to 4in. long	 5
4.	Pods spreading from stem: stalk of pod very slender, about ⅓ as long as pod (Fig. 3 B)	*Descurainia sophia*
	Pods closely pressed to stem: stalk of pod stout, short (Fig. 3 C)	*Sisymbrium officinale*
5.	Upper stem leaves cut to narrow segments: tumbleweed (Fig. 3 D) ..	*Sisymbrium altissimum*
	Upper stem leaves not cut to narrow segments (Fig. 3 E)	*Sisymbrium orientale*
6.	Pod transversely jointed, not opening by 2 valves (Fig. 3 F, G)	 7
	Pod opening from below upward by 2 valves, not transversely jointed (Fig. 3 C)	 8
7.	Pod narrow with shallow constrictions between seeds: easily broken into segments (Fig. 3 F)	*Raphanus raphanistrum*
	Pod broad with deep constrictions between seeds: not readily broken into segments (Fig. 3 G)	*Raphanus maritimus*
8.	Pod tightly pressed to stem (Fig. 3 H)	 9
	Pod spreading from stem (Fig. 3 K, L)	 10
9.	Stem hairs downward directed (Fig. 3 H)	*Hirschfeldia incana*
	Stem hairs spreading or absent (Fig. 3 I)	.. *Brassica nigra*
10.	Pod valves 3 to 7 nerved, beak half as long as pod (Fig. 3 J)	.. *Sinapis arvensis*
	Pod valves with middle nerve only (Fig. 3 K, L)	 11
11.	Upper stem leaves stalked or with stalk-like base (Fig. 3 K)	*Brassica tourneforti*
	Upper stem leaves rounded at base or with base clasping stem (Fig. 3 M) ..	 12
12.	All leaves without hairs: flower buds overtopping the open flowers (Fig. 3 L)	*Brassica oleracea*
	Lower leaves at least bristly: opened flowers overtopping the buds (Fig. 3 M)	*Brassica campestris*



SPECIES WHICH MIGHT BE CONFUSED WITH MEDITERRANEAN MUSTARD

Brassica campestris (wild turnip)
B. nigra (black mustard)
B. oleracea (wild cabbage)
Descurainia sophia (flixweed)
Hirschfeldia incana (hoary mustard)
Raphanistrum rugosum (turnip weed)
Raphanus maritimus (sea radish)
R. raphanistrum (wild radish)
Sinapis arvensis (charlock)
Sisymbrium altissimum (tumbling mustard)
S. officinale (hedge mustard)
S. orientale (oriental mustard)

Why Regarded as a Weed

From Australian experience the following reasons are given why Mediterranean mustard is regarded as a troublesome weed:—

1. The free-seeding habit and quick maturity enable it to spread rapidly.

2. A robust, spreading initial rosette of leaves which crowds out other plants.

3. The ability to mature earlier than a wheat crop in which it is growing.

4. The tumbleweed character at maturity; the stem breaks off at ground level and blows with the wind.

5. When the weed is present in a wheat crop its early maturity allows the stem to break off and the dried plant to blow across the top of the wheat crop, broadcasting seed as it tumbles.

6. The dried stems are difficult to handle with harvesting machinery.

7. The dry, wind-blown plants pile up against fences and plantations, fill up drains and depressions, and could constitute a fire hazard.

8. The plant grows equally well on roadsides, in waste land and cropped land, and, owing to its tumbleweed character, it can spread readily from waste land to cropping areas.

9. While some farmers state the plant is grazed, others contend that it is unpalatable and avoided.

Means of Spread

The tumbleweed character at maturity enables the weed to spread widely on waste land and individual properties, and highlights the need to prevent seeding. Transfer of farm produce as hay, chaff, grain, etc., has proved important in Australia in the spread of the weed from district to district.

In Western Australia it was found that second-hand sacks were significant in spreading seed from farm to farm and district to district; this spread was counteracted by dipping the sacks in boiling water or into a 5 per cent. bluestone solution, these treatments killing the seed.

Means of Control

The following methods of control have been used in Australia:—

1. Pulling and hoeing scattered plants.

2. Clean fallow.

3. Taking heavily infested land out of cropping and using it for grazing.

4. Refraining from sowing of crops until as late as possible to allow seedlings to germinate with the autumn rains.

5. Use of hormone weedkillers: Meadley (1953) reports that in Western Australia the amine salt of 2,4-D at 6oz. acid equivalent per acre applied at 1 to 2½ gallons per acre by both aerial spraying and land spraying proved successful in controlling the weed.

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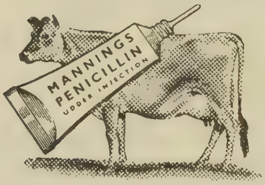

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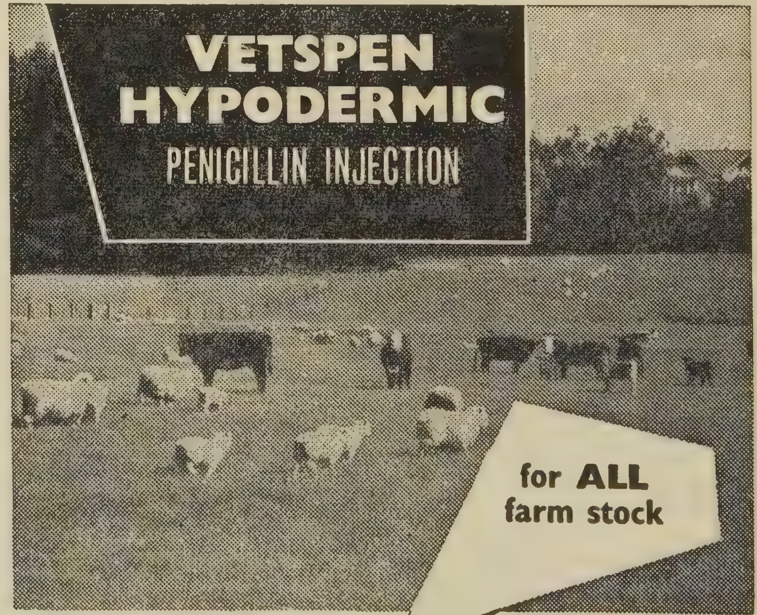

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The Home Orchard in Autumn

AUTUMN is the main harvest period for many fruits, but picking the crop is not the end of all work for the year. In this article by S. P. Money, Instructor in Horticulture, Department of Agriculture, Wellington, some points on the role of grass in the home orchard are discussed as well as other activities such as the selection of varieties of pip and stone fruit, storage of fruit, and disease and pest control.

[National Publicity

AUTUMN is the time to select varieties for replanting or replacement, while the nurseries still have reasonable stocks available.

When trees are chosen for planting thought should be given to the time of maturity and whether they are to be eaten raw or cooked. The following list gives particulars of some of the more popular varieties of tree fruits, including their maturity period.

Preparing for Planting

Holes can now be dug to receive the trees in the planting season. Care in preparing the ground early will be repaid by better establishment of the young trees and adequate growth in the first spring and summer, which will give a well-developed young tree to shape by pruning in the following winter.

The holes should be basin shaped, about 18in. deep and 2ft. 6in. to 3ft. wide. The bottom should be covered thickly with well-rotted animal manure or other organic matter such as compost and this should be dug in. If the soil tends to be acid, the hole should be dusted with either 2oz. of hydrated lime or 3oz. of ground limestone. The holes can then be left open to sun and rain until the trees are ready to plant.

Windy conditions have prevailed during this season and any damaged parts of trees, such as broken branches, should be trimmed down neatly with secateurs and sealed to prevent the entry of silver leaf. Many fructifications of this disease become apparent on dead, infected wood during autumn and a tremendous spore discharge ensures that any cuts or breaks left unsealed will become infected.

Grassing Down

Grassing down of home orchards is not new, as for many years home orchards and lawns have been associated in all parts of the country. During the last few years, however, much information has been accumulated during investigations of the possibilities of grassing down of commercial orchards.

One of the main problems associated with grassing down of orchards with tree fruits is the early competition between grass and tree roots, resulting in a slight loss of crop, a factor which is more than offset in the home orchard by the easier working conditions. This slight loss of crop can be overcome by a generous fertiliser programme incorporating additional nitrogen and by keeping the grass well mown, thus reducing its capacity to compete with the trees for soil nutrients.

The advantages of grassing down are that labour is reduced through the elimination of cultivation, the grass improves soil structure, thereby improving drainage of excess water and at the same time increasing the capacity of the soil to retain sufficient moisture for essential water and aeration. Grass gives a more even surface, increases the playing and living area for children and adults, and improves working conditions in all weather.

Grass is best sown in autumn when normal lawn planting is carried out. Because grass in the home orchard is usually kept as a lawn, the seed mixture should differ somewhat from that used to grow swards in commercial

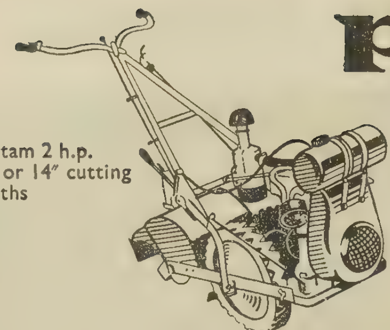
FRUIT VARIETIES, POLLINATORS, AND MATURITY TIMES

Varieties	Pollinators	Colour	Uses	Maturity
Apples				
Irish Peach	Fruit setting in all varieties is improved by cross pollination and all varieties may be pollinated by any of the following: Cox's Orange Pippin, Sturmer, Ballarat, Jonathan	Striped	Dessert	January
*Gravenstein		Striped	Dessert and culinary	Jan.-Feb.
*Cox's Orange Pippin		Striped	Dessert	Feb.-Mar.
*Red Jonathan		Red	Dessert	March
*Red Delicious		Red	Dessert	Mar.-April
*Golden Delicious		Yellow	Dessert	Mar.-April
Rome Beauty		Striped	Dessert and culinary	April
*Sturmer Pippin		Yellow	Dessert and culinary	April-May
*Granny Smith		Green	Dessert and culinary	April-May
Ballarat		Green	Culinary	May
Pears				
*Williams' Bon Chretien	Beurre Bosc		Dessert and culinary	February
Beurre Bosc	Williams' Bon Chretien		Dessert and culinary	March
Louise Bonne de Jersey	None required		Dessert	March
*Winter Cole	Williams' Bon Chretien		Dessert	March
*P. Barry	None required		Culinary	April
Peaches				
†Brigg's Red May	Pollinators not essential, but interplanting recommended for better pollination		Dessert	Dec.-Jan.
Triumph			Dessert	Dec.-Jan.
*†Wiggins			Dessert and culinary	January
*Paragon			Dessert	February
*Mary's Choice			Dessert	March
Golden Queen			Culinary	March
Hobb's Late			Dessert and culinary	April
Apricots				
Roxburgh Red				Early
Early Moorpark				Early
Moorpark				Mid-season

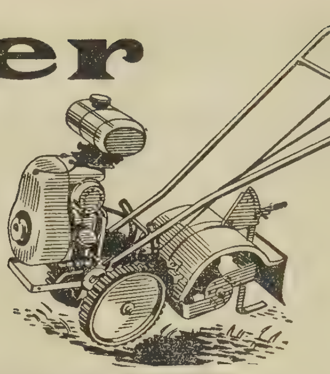
* Preferred varieties where space is limited.

† White-fleshed varieties; others are yellow fleshed.

power



Bantam 2 h.p.
10″ or 14″ cutting
widths



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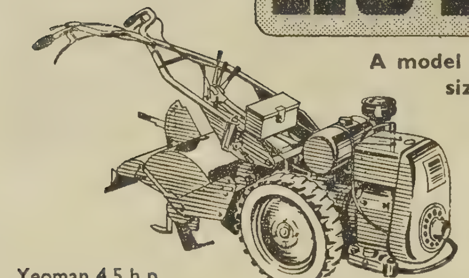
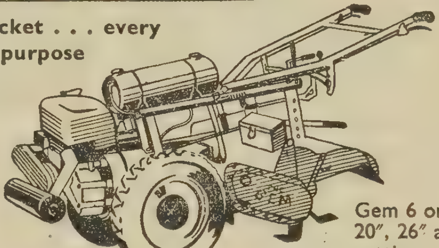


Yeoman 4.5 h.p.
15″ or 18″ cutting
width



Gem 6 or 9 h.p.
20″, 26″ and 30″
cutting widths
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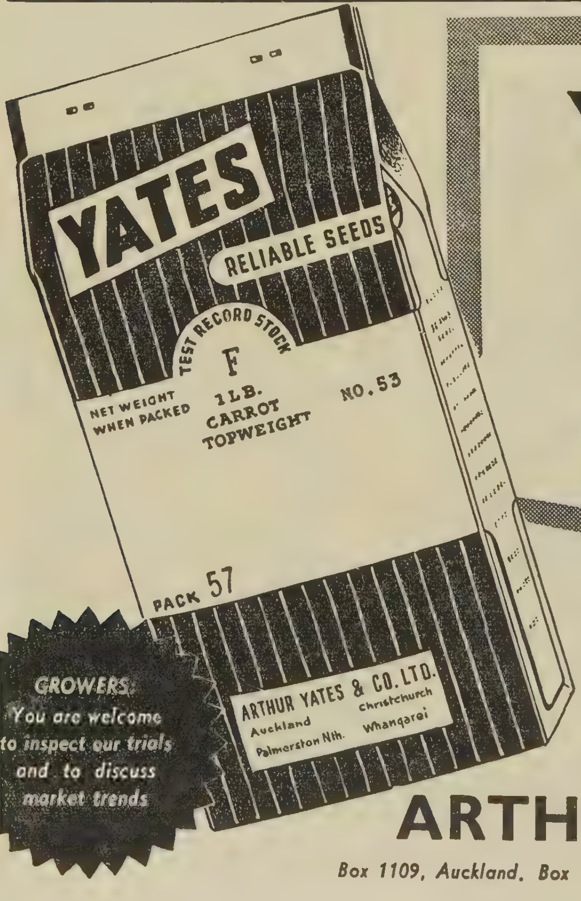
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orchards. A suitable mixture for 10 sq. yds. is:—

	oz.
White clover	½
Browntop	½
Chewings fescue	½
Total	1½

This mixture provides a lawn texture with clover for nitrogen production.

To establish a good grass area a level and firm seed-bed is essential and the soil should not be too acid or clover will not grow satisfactorily. A slightly acid soil (pH 5.6 to 6.5) is satisfactory for clover establishment.

Fertiliser applications for grassed-down orchards do not differ materially from those used in ungrassed orchards, but a little extra is applied for the first few years until the trees are established.

Fertiliser application for new plantings should be 2lb. to 3lb. of the following mixtures, and these should be increased by an extra pound for each year of growth until 8lb. to 10lb. per tree is applied to fully grown trees.

An orchard mixture suitable for pip and stone fruit trees on most soils would be:—

	Parts by weight
Blood and bone	6
Superphosphate	4
Sulphate of potash	2
Sulphate of ammonia	2

For citrus the above mixture plus two parts of dried blood, applied at the same rates, would be suitable.

Nearly all pip fruits, including quinces, will grow and produce satisfactory crops under a grass sward. Stone fruit (plums, cherries, and peaches) grow satisfactorily with a little extra nitrogen. Weaker-growing peach trees such as the Buttercup variety appear to be less suitable for growing under these conditions.

Pip Fruits

Most main and late crops of pip fruits ripen during autumn and it has been usual in home orchards to pick most of the crop at maturity for storage and to leave some on the trees to supply tree-ripened fruit.

This latter system is impracticable in districts where European wasps abound, as they will damage fruit left on the trees. In such areas storage of fruit has become a problem also, for the wasps will also attack stored fruit if it is not protected sufficiently. Thus where once it was sufficient to store the fruit in racks with wire-netting bottoms, now it may be necessary to modify the structure so that it is entirely covered by wire gauze, which will stop wasps entering.

Fruit should be handled carefully during picking and only first-class fruit stored. Though minor damage due to codling moth stings or other

The slight loss of yield that may result from competition of grass with trees in a grassed orchard may be offset by a generous dressing of a complete fertiliser round the drip areas of trees and by mowing the grass regularly.

blemishes will not render tree-ripened fruit unusable, it is extremely important that fruit with these faults should not be kept for later use. Damaged fruit stored with good fruit causes extra handling and sorting.

In orchards without lawns cultivation round trees is worth while in autumn to reduce weeds and allow a clear area for the collection of diseased fruit.

Stone Fruits

Wet weather in spring and early summer in many parts of the country this year has encouraged a build-up of brown rot in stone fruit and shoot, blossom, and fruit infection has been common. The normal autumn clean-up of diseased and mummified fruit should be done, but pruning out of dead twigs and shoots now is worth while, as it saves considerable time and reduces the problem in winter, when the trees are leafless.

Peach trees which have carried a heavy crop are worth examining at this time of the year as an object lesson in the need for thinning. If a tree has carried too large a crop or if it has set unevenly so that some shoots have too much fruit, the growth differences of the new shoots can be readily observed. Where shoots have carried a heavy crop little or no growth occurs either as terminal growth or as the more satisfactory growth from the base of the shoot which has fruited. During winter pruning, when the old, spent wood should be cut out, it will be found that new wood has been produced to replace it and biennial bearing may result.

Citrus Fruits

In cooler districts where strong autumn winds are common the growing tips of citrus trees suffer appreciably from wind burn and provide entry points for disease, and when this damage is likely the tree should be adequately protected. When such damage occurs the wind-burnt tips should be removed by pruning back to a bud below the damaged portion. (There is a bud in the axil of each leaf.) A spray of bordeaux mixture (4oz. of bluestone and 5oz. of lime to 4 gallons of water) should then be applied for protection against bacteria and fungi.

Insect pests of citrus can be controlled at this time by a spray of summer oil (1 pint to 4 gallons of water).

Berry Fruits

Autumn is the time for a good clean-up in the berry fruit garden. If **raspberry** canes have not been pruned, this should be done as soon as possible. If raspberry rust has been present during the season, prunings and leaf litter should be burnt. A lime sulphur spray (1 in 30) should also be applied in late autumn to destroy overwintering spores.

Strawberries may be sprayed at this stage with bordeaux mixture (6½oz. of bluestone and 5oz. of lime to 4 gallons of water) for winter protection against fungous diseases.

Black, red, and white currants: Leaf-spot diseases of currants cause far more damage to bushes and far greater losses to crops than is generally realised. Two kinds of fungi cause such diseases of currants. Both cause spotting or premature yellowing of the leaves followed by leaf drop.

If these symptoms have appeared during the season and spraying has not been done, it is wise to spray now with bordeaux mixture (5 : 4 : 50) to reduce the effect of overwintering spores on leaves and litter. (Bordeaux mixture 5 : 4 : 50 is 6½oz. of bluestone and 5oz. of hydrated lime to 4 gallons of water.)

Grapes: Selection of grape varieties can be made during autumn and an order placed with a nurseryman. The main table grape grown in New Zealand home orchards is Albany Surprise, which has a rather coarse flavour, high acidity, and matures late in the season.

Chasselas and Palomino grapes are two kinds which have a pleasant, sweet taste. Golden Chasselas grows well in most grape-growing districts of New Zealand. It requires protection from diseases such as downy mildew, black spot, and oidium, but when protected from these it keeps well on the vine. There are several varieties of Chasselas grapes which may be suitable for home gardens. The parsley-leafed Chasselas has a decorative foliage and the fruit of the Ruby Chasselas has a ruby-red colour which gives a very attractive appearance.

Palomino, a golden, amber grape with large bunches, ripens in mid-March. It is a good table grape with an interesting flavour, but requires a well-drained soil to grow successfully.

A recent introduction which ripens in early February is the medium-sized purple grape Pirovano 15. This grape shows great promise and should be kept in mind for future years.

Within a few years plants of this variety should be available from nurserymen.

Fruit Crop Estimates for 1957-58 Season

THE following estimates made in December of the fruit crop for the 1957-58 season are in 000's of bushel cases. They are summarised from information supplied by field officers of the Horticulture Division of the Department of Agriculture. Districts producing less than 500 bushels of a variety are not shown, but are included in totals. District totals of more than 500 are rounded to the nearest 1000.

FRUIT	DISTRICT								
	Auckland Province except Gisborne	Gisborne	Hawke's Bay	Wellington and Taranaki Provinces	Nelson Province	Marlborough	Canterbury and North Otago	Central Otago	Total 000 bushels
APPLES—									
Ballarat	70	7	95	2	7	7	15	2	205
Cox's Orange Pippin ..	9	2	107	2	116	13	18	13	280
Delicious	32	7	182	4	203	26	28	44	526
Dougherty	17	4	75	—	29	2	—	—	127
Granny Smith ..	107	4	155	6	100	3	3	5	383
Gravenstein	22	—	42	—	66	1	1	2	134
Jonathan	9	—	59	1	251	35	18	33	406
Sturmer	7	5	245	12	264	36	65	41	675
Others	109	5	228	9	292	19	52	52	766
Totals	382	34	1,188	36	1,327	142	200	192	3,501
PEARS—									
Beurre Bosc	4	1	3	—	9	—	—	—	17
Louise Bonne de Jersey	2	—	26	—	1	—	—	1	30
Packham's Triumph ..	11	—	11	—	9	—	—	—	31
P. Barry	7	1	21	—	6	—	2	—	37
W. B. Chretien ..	20	—	85	—	56	—	5	8	174
Winter Cole	1	1	70	—	46	1	7	6	132
Winter Nelis	—	1	49	—	10	1	3	14	78
Others	30	—	9	—	14	—	10	6	69
Totals	75	4	274	1	151	3	27	35	570
OTHER FRUITS—									
Peaches	101	15	402	2	57	7	9	93	686
Apricots	3	1	7	—	—	—	19	141	172
Nectarines	2	2	16	—	2	—	2	27	52
Plums	58	3	96	1	12	2	12	35	217
Cherries	—	—	1	—	—	3	2	11	17
Quinces	6	—	8	—	3	—	1	—	19

Getting Ready for New Pullets in Household Poultry Unit

MANY household poultry keepers have reached the time of year when either new pullets are expected or old birds are being discarded. At this time it is necessary to clean out and prepare the poultry shed for a new season. This article by the Animal Industry Division describes some of the things which should be done and wise precautions to take.

THOUGH the wise household poultry keeper will endeavour to keep the poultry shed clean and tidy throughout the year and will constantly attend to the cleanliness of equipment such as water troughs, mash hoppers, and nest boxes, a thorough clean out once a year is highly desirable. In most instances February or March is the best month for this job. Wherever possible it is best to empty the laying shed of birds, as this permits of the most efficient cleaning and disinfecting.

Removal of Litter

The first job is to remove all litter from the floor. If this litter has been in the house for some 10 or more months, it will be broken down into a fine condition and be excellent for the garden or compost heap.

Different opinions are often expressed about how long litter may be left in a poultry shed without being cleaned out. Some maintain that the litter must be cleaned out several times a year. Provided serious trouble is not experienced from bad weather or driving rain, the commercial poultry farmer leaves litter in a laying shed for 10 to 12 months. There appears to be no reason why this practice should not be equally satisfactory for the household poultry unit.

Where straw is used it gradually breaks down and eventually can become almost a fine dust. As long as this material remains friable, dry, and without undue odour it is quite satisfactory. It may appear dirty, but this need not cause any concern.

During the last war, in the United States and in the United Kingdom litter was left over for a second year in laying houses simply because there was insufficient labour to remove it. To everyone's surprise the birds not only did not suffer, but produced particularly well and remained in good health. These results led to the development of the present true deep-litter system, in which only a small part of the litter in laying sheds is removed annually and new litter added. Thus if a good depth of dry litter is maintained in a household poultry house, the litter need be cleaned out completely only once a year.

The Floor

The way in which the floor is treated will depend entirely on the material of which it is constructed.

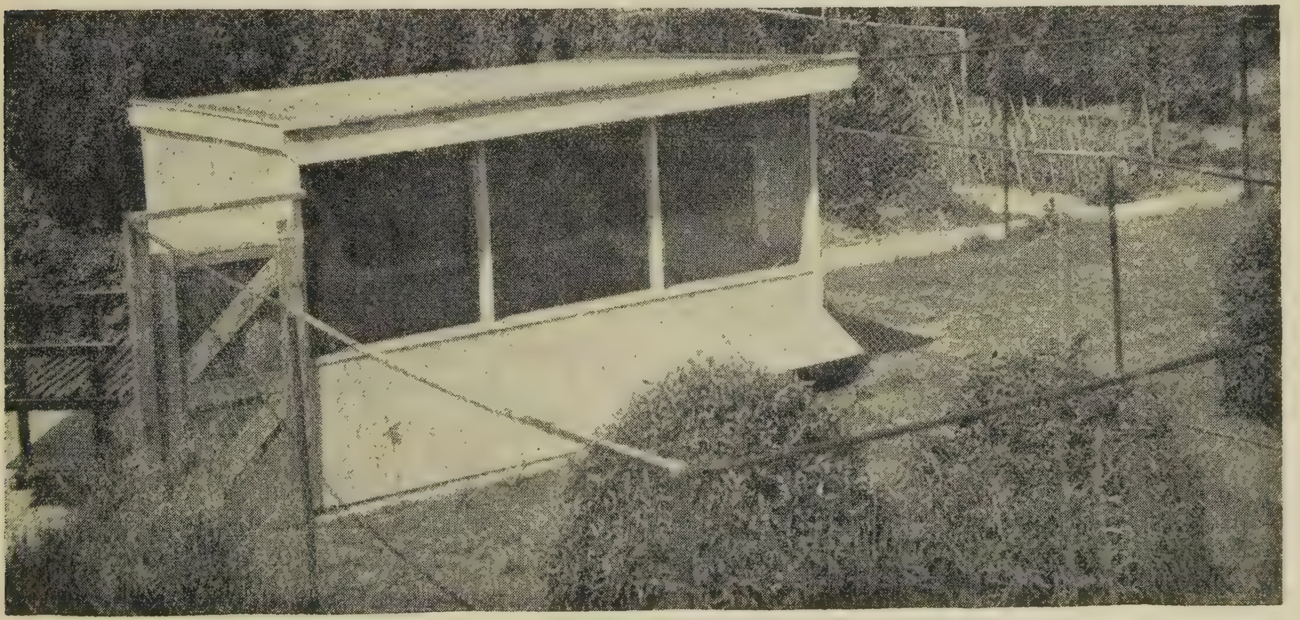
Concrete Floors

Many fowl sheds have concrete floors. Where practical these can be hosed down with water or flooded with water containing a little caustic soda. The latter is an excellent disinfectant for destroying all types of disease organisms. Washing with water is practical mainly where the floor slopes toward the door and the surplus water can be brushed out of the house. Where it is difficult to get all the water out of a house thorough brushing with a stiff brush may have to suffice. It should be followed by spraying with a suitable disinfectant.

If a really smooth surface was given to the concrete floor when it was laid, cleaning will be easier and far more efficient. Concrete with a rough surface is most difficult to clean effectively.

Wooden Floors

Wooden floors in poultry houses are not common in New Zealand, but they can be cleaned and disinfected comparatively easily. After the litter has been removed the boards should be thoroughly scraped. A hoe or painter's stripper are useful for removing litter or droppings stuck to the boards. After being brushed thoroughly the



A well-built, excellently kept household poultry unit. The outside run is in very good order. Compare it with that of the badly constructed unit on the next page.

Outside runs are not recommended for household poultry units because they are not essential for laying birds and because too often they are allowed to deteriorate to a state where the health of the birds is endangered by unhygienic conditions such as those shown.

boards should be painted with creosote, which acts both as a disinfectant and as a wood preservative.

Earth Floors

Earth floors are not common and generally are not recommended. For the annual cleaning it is desirable to remove at least the top 2in. of earth and to replace this with fresh earth. Far too often earth is removed and not replaced. Over the years the level of the floor gets lower and lower until in some situations there is danger of water soaking into the floor from the higher earth outside. Dealing efficiently with an earthen floor each year involves considerable labour.

Walls and Roof

With the walls and roof also treatment may differ according to the type of material used.

Wooden Walls

Opinions differ as to the best treatment of wooden walls. If they are treated annually, efficient cleaning and disinfection can be achieved. Creosoted walls make a house dark, particularly during dull, short days in winter. Birds respond to light conditions, well-lighted houses tending to make them more active than does dark housing. This applies particularly where birds are confined to the house under the intensive system of housing. Houses that are whitewashed annually reflect the light.

It is suggested that the boards should be left light in colour or whitewashed. A disinfectant can be incorporated in whitewash. Otherwise the underside of the roof and walls should be brushed down thoroughly and then sprayed with a disinfectant. Complete cleaning of the walls or roof should if possible be done before the final cleaning of the floor.

Asbestos Sheeting

Walls of asbestos sheeting can be hosed down when the floor is cleaned. Asbestos, being lighter in colour than wood, does not need to be whitewashed, though whitewashing is very effective in making the house light.

Nest Boxes and Perches

Nest boxes and perches should be removed from the house, cleaned, and creosoted if made of wood.

Repairs and Painting

It is highly desirable once a year during the annual clean out to examine both the outside and inside of the house for necessary minor repairs. Hinges, bolts, and locks on doors benefit from being oiled instead of being allowed to rust up gradually until replacements become necessary. Household poultry sheds can be made quite attractive or at least prevented from becoming an eyesore by being painted. The buildings are not big, so neither heavy costs nor much labour are involved. Regular paintings lengthen the life of fowl houses.

Outside Runs

Though the Department does not recommend outside runs for small household poultry units, some have them. If they are used, they should be cleared of all old cabbage stalks, bones, and odd rubbish which may have been allowed to accumulate.

Few of these runs have any permanent grass on them and consequently they should be dug over. Liming helps to sweeten the soil, but has little beneficial effect in getting rid of internal parasites such as coccidiosis or parasitic worms.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during November 1957 and for the 4 months ended 30 November 1957 with comparative figures for the same month and the 4 months of 1956 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
November 1957	25,157	405	25,562	—
November 1956	24,315	422	24,737	—
Increase or decrease	+842	—17	+825	+3.335
4 months ended 30/11/57	79,906	1,188	81,094	—
4 months ended 30/11/56	72,761	1,185	73,946	—
Increase or decrease	+7,145	+3	+7,148	+9.666

Butter in store at 30 November 1957 was 19,375 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
November 1957	11,504	1,953	13,457	—
November 1956	11,951	1,914	13,865	—
Increase or decrease	—447	+39	—408	—2.942
4 months ended 30/11/57	29,727	4,992	34,719	—
4 months ended 30/11/56	29,733	4,012	33,745	—
Increase or decrease	—6	+980	+974	+2.886

Cheese in store at 30 November 1957 was 16,689 tons

If these figures are converted into butterfat equivalent, there is an increase of 8.510 per cent. in butterfat graded for the 4 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Overdrilling of Pastures and Crops

By L. W. BLACKMORE,
Instructor in Agriculture,
Department of Agriculture,
Dannevirke

GREAT interest has been aroused in recent years in the practice of overdrilling to improve pastures or even certain crops. Results from this work to date and details of the conditions under which it is likely to be successful were given in the first part of this article in last month's "Journal". Further points about overdrilling are given in the concluding part of the article, which follows.

THE future potential of overdrilling centres round the effectiveness with which the immediate competition from adjacent plants in the sward can be reduced by the action of the overdrilling machine in severing, displacing, and dislodging plants.

Overdrilling Equipment

It is unfortunate, but nevertheless true, that the chief obstacle to the successful overdrilling of pastures has been the absence of suitable machines for producing the desired types of furrow under the wide variety of conditions in this country.

The desired type of furrow should consist of a V-shaped, continuous, plant-free track of comparatively shallow and even depth. The optimum width of the V at the surface will vary with conditions, but for very aggressive swards it may need to be up to 2in. across; the depth should be within the range of ½in. to 1in. The V should remain open long enough to give the seedlings adequate protection during their critical establishment stages.

Such a furrow would make overdrilling a much more certain venture and would extend the application of the practice very considerably. To achieve the desired type of furrow the following mechanical advantages would need to be incorporated in a suitable machine.

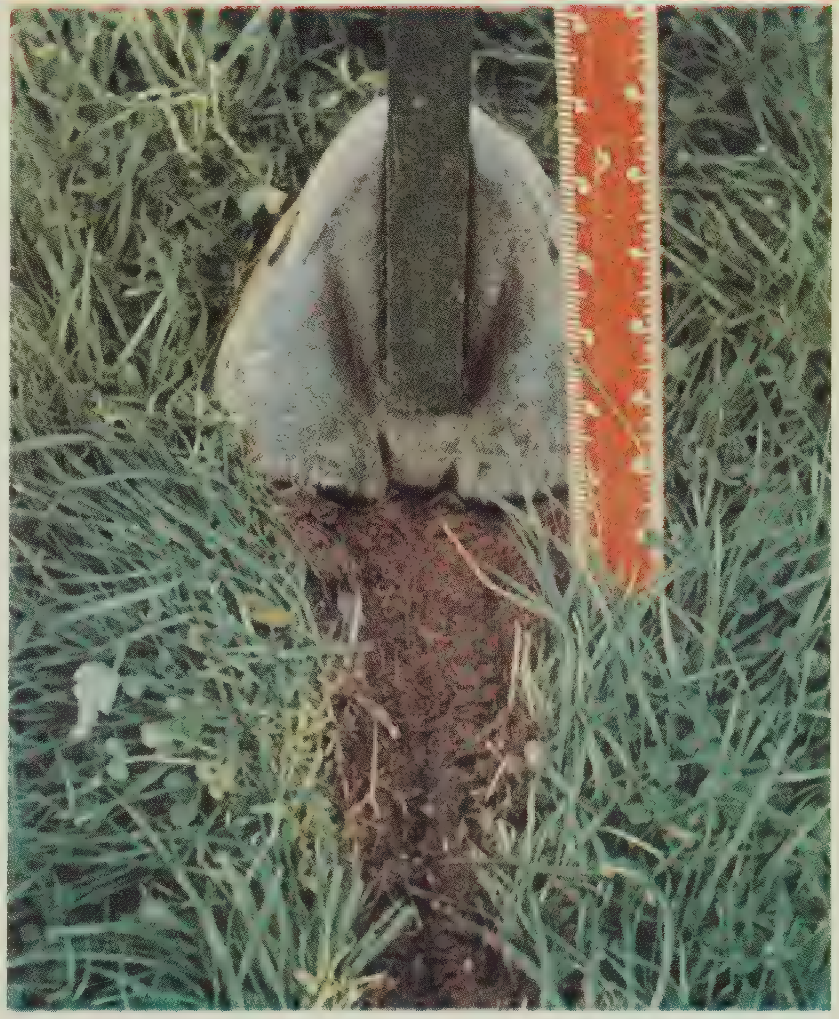
(a) Independent coulter action: This movement would need to be not only horizontal (stump-jump action as incorporated in most hydraulically mounted tillers) but vertical.

(b) Good penetrating ability.

(c) Self-regulating depth control mechanism: This should be attached in such a way that each coulter can vary its depth of penetration in conformity with surface irregularities.

(d) Furrow openers capable of producing wide, V-shaped furrows.

(e) Self-covering device: This should be an adjustable tine or similar device attached to the rear of the furrow opener and fitting neatly into each furrow for the specific purpose of positively covering the seed. Such a device would make unnecessary the dragging of harrows behind the drill for covering, which often does considerable harm by depositing clutter on top of the furrows and so interfering with seedling emergence. The device would have a further advantage over harrows under moist soil conditions, in that with a slight application of pressure it could push the seeds into the substance of the furrow bottom.


Rear view of the type of furrow produced by the disc plus moulder.

It is, however, unlikely that a single design of overdrilling machine would serve all conditions. For instance, the disc principle is essential for trashy conditions, and some type of "point" is necessary for stony soils.

The machinery at present available for overdrilling is discussed below with regard to the points mentioned above.

Machines with Penetrating Points

There are two variations of this principle:—

1. Grain drills fitted with grassland tips: The chief advantage of this method is that if a drill is already owned by a farmer, only a small outlay is involved in equipping it for overdrilling. Under suitable conditions these points will produce a very satisfactory type of V furrow. However, their limitations are difficulty in dealing with surface trash and lack of

Contagious Abortion

can be prevented

The Department of Agriculture recommends that every heifer calf should be vaccinated against contagious abortion. Farmers wishing to enjoy the benefits of Calfhood vaccination should consult their veterinarian or a Livestock Instructor as early as possible.

TVL

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Portion of a crop of white-fleshed turnips overdrilled into a pasture which was sprayed with chemicals 10 days before the turnip seed was sown.

sufficient penetrating power, especially by old, mechanically unsound drills. The points also wear fairly quickly, especially on abrasive soils.

Unlike most disc drills and special overdrilling attachments, the ordinary hoe-coulter grain drill will not sow to the low grass seed rates of 6lb. to 8lb. required for overdrilling. This presents a difficulty which can, however, be satisfactorily overcome in a number of ways.

The seed can be carefully mixed with the fertiliser. Where 8lb. of grass seed per acre is to be sown with 2cwt. of fertiliser, 4lb. of seed should be mixed with 1cwt. of fertiliser. Provided the mixing is done carefully and the fertiliser is of good, even quality and free from lumps, a good distribution of seed can be obtained. The second method is to sow the seed through the fine (wheat) side of the grain box using a filler of sawdust or sawdust plus lime. The amount of filler required will vary considerably, depending on the nature of the material used. The third method is the use of special "filler plate" attachments which are made to slot into the seed wells of certain grain drills. The fourth method is to insert a countershaft in the gear train of some makes of drills to give a 3 : 1 reduction in seeding rates. Those wishing to obtain specific details of this attachment should get in touch with Mr. M. W. Cross of Massey Agricultural College.

It cannot be stressed too strongly that with the low rates of short-rotation ryegrass sown through the grain box special care must be taken to ensure that the seed does not "bridge" in the seed wells. This it is almost bound to do, particularly if the short-rotation is strongly awned, unless a close watch is kept. Under these circumstances a man should always be on the drill to keep the seed well stirred, especially in the seed wells. Having the grain box not more than a third filled with grass seed at any time will reduce the chances of bridging.

Clovers can be sown either through the turnip box or mixed with the fertiliser.

2. **Tractor-mounted tillers fitted with penetrating shoes:** A combined seed and manure box is mounted directly above the tiller, the seed and manure being directed into the pasture furrows made by the penetrating shoes in the same manner as for an ordinary grain drill. These machines have particularly good penetration. However, because the tines are fitted to a rigid frame they have no individual up and down freedom of movement. They cannot therefore follow surface irregularities, with the result that a great deal of bridging occurs, causing considerable variation in furrow depth.

This tendency is often quite marked even on a comparatively even surface. There is also a distinct tendency with some machines, especially under moist turfy conditions, for the shoes to "telescope" their way through the turf, with the result that the furrows tend to close over at the surface behind the machine.

Disc Principle Machines

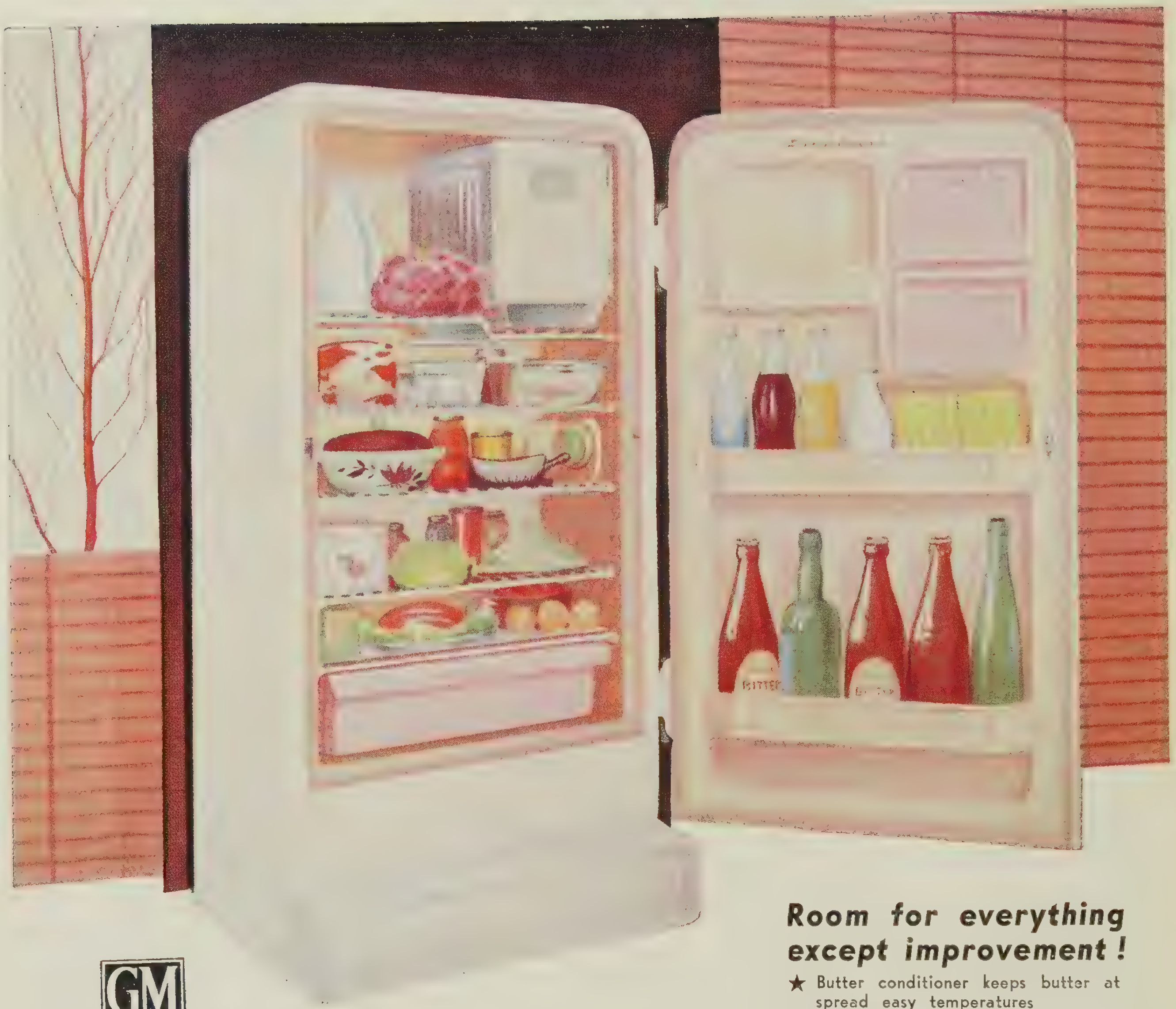
1. **Disc coulter drills:** An outstanding feature of these drills is their excellent penetrating power and their ability to cope with trashy surfaces. These machines are ideal for overdrilling a fed-off chou moellier crop that would be practically impossible to handle with a point type of furrow opener.

The chief disadvantage of the disc drill to date has been the tendency for the furrow slice to fall back into its original position again immediately behind the drill. The tendency is especially noticeable where soil conditions are moist and pasture is inclined to be turfy. This is a most undesirable feature, as the cut turf tends to knit rapidly. The result is that the emerging seedlings either become completely trapped or come through in a greatly weakened state. However, under drier conditions, especially in the freer types of soil, if the drill speed is increased to about 6 miles per hour, the furrow will remain open fairly well.

Experiments at Massey College have shown that the tendency for the disc drill to give uneven penetration can be overcome by attaching a skid to each coulter. Increased pressure can then be applied to ensure full penetration in the harder patches.

2. **Disc seeders:** A reasonably good home-made overdrilling machine can be constructed by mounting a seed and fertiliser box above a set of out-cut discs. Where hydraulically operated equipment is available the front set of tandem discs and the seed and manure box can be mounted on the hydraulic linkage system for ease of handling. The seed boxes are driven off the discs by a sprocket and chain while the seed and fertiliser are collected from the boxes into funnels and led down via plastic tubing to the furrows cut by the discs. The great merit of such a unit is that the equipment is already available on many farms.

Penetration of such a machine can be quite satisfactory if the discs are sharp and extra weight is added if required. Because the discs have greater concavity than those of a disc drill they will scoop out a wide furrow. However, for the same reason they tend to penetrate too deeply unless precautions are taken to pre-



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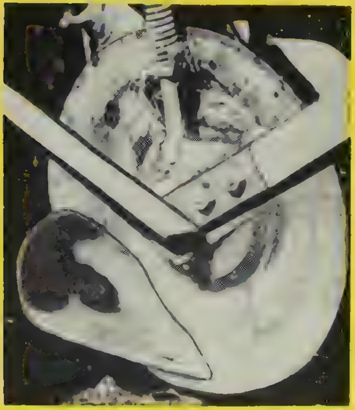
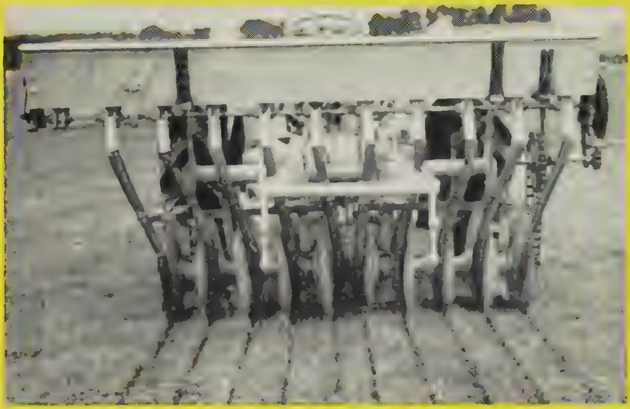
OVERDRILLING EQUIPMENT

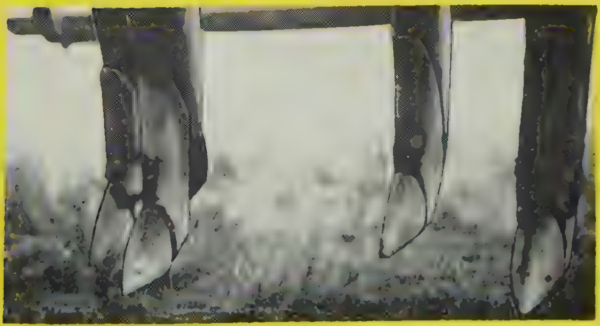
Area being overdrilled with modified disc drill with skimmers attached. By such treatment existing species can be checked so that they do not provide excessive competition to the establishing seedlings.



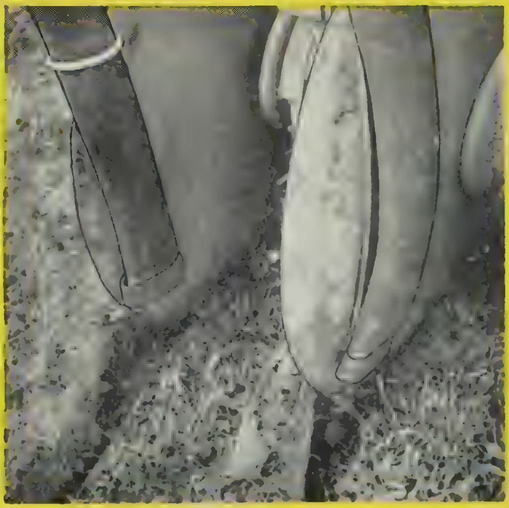
Disc coulter drill fitted with small skimmer which ensures positive removal of the cut slice. This method is under investigation by Mr. M. W. Cross, Massey College, and appears to be showing considerable promise.



▲ Disc seeder consisting of the front row of a set of tandem discs plus a grass seed box all mounted on the hydraulic linkage system.



Grassland tips fitted to the coulters of a grain drill for overdrilling.



Furrows made by the discs of a disc seeder. Note the tubes conducting the seed and fertiliser into the furrows.

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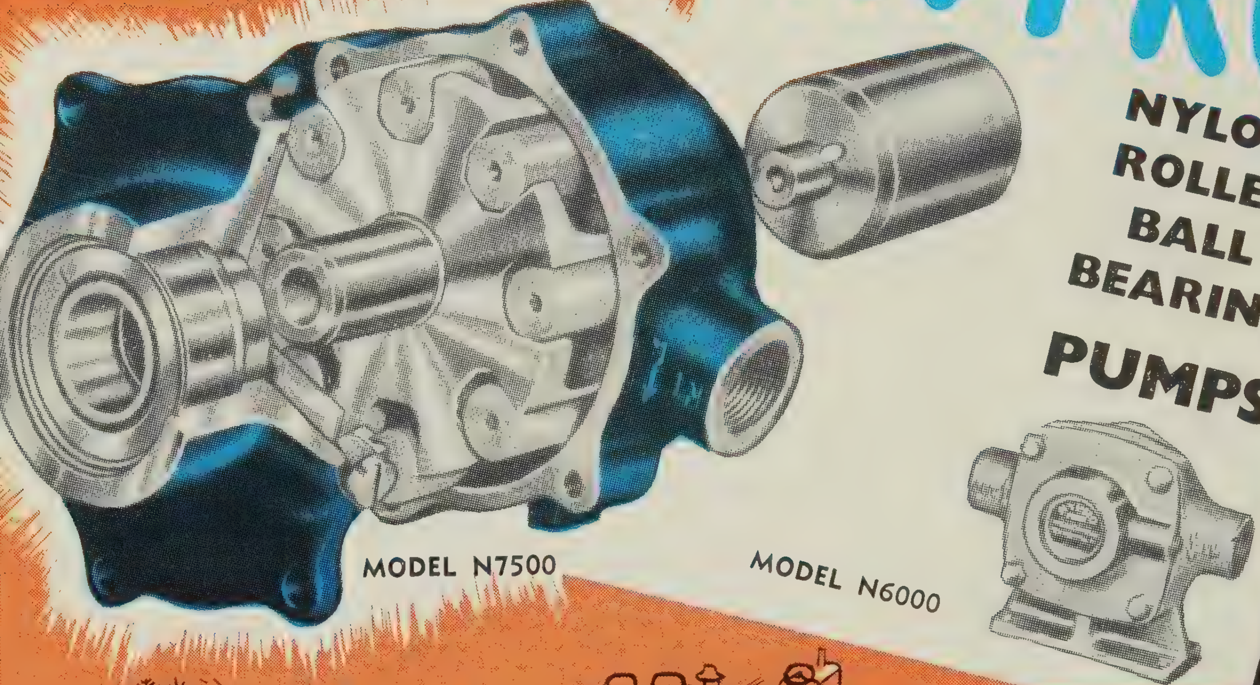

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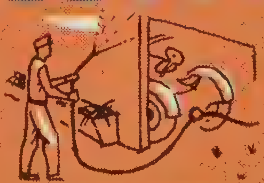

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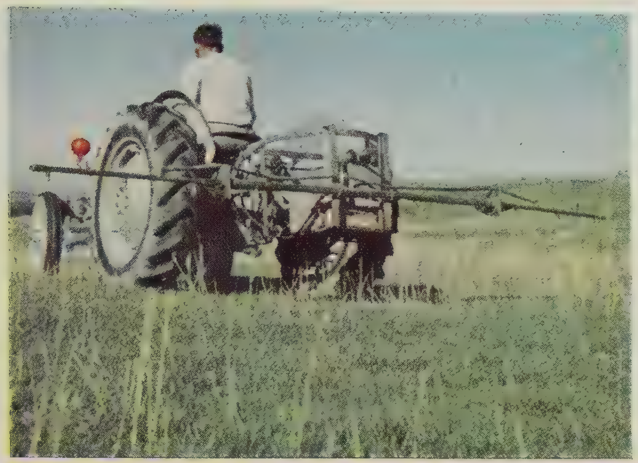
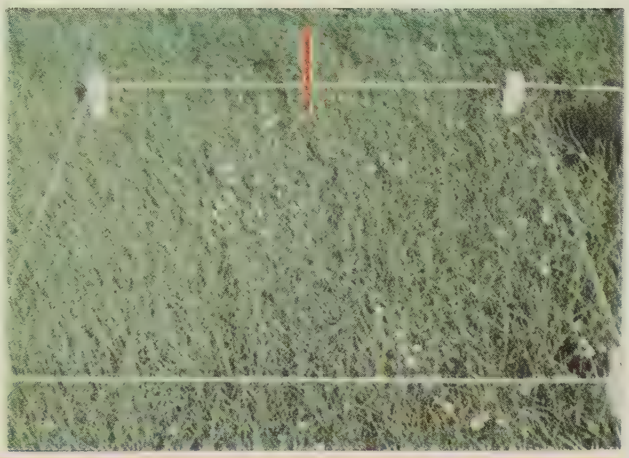


A boom sprayer used in the experiments made to determine the value of chemicals in overcoming sward competition.



Section of plot where an entirely new pasture was established on a chemically killed sward. The pasture mixture was merely broadcast on to the old turf 4 days after spraying.

vent this. This tendency has been ingeniously overcome by some farmers by fitting skeleton wheels between the second and third discs from each end. The depth of penetration is then controlled by the wheels.

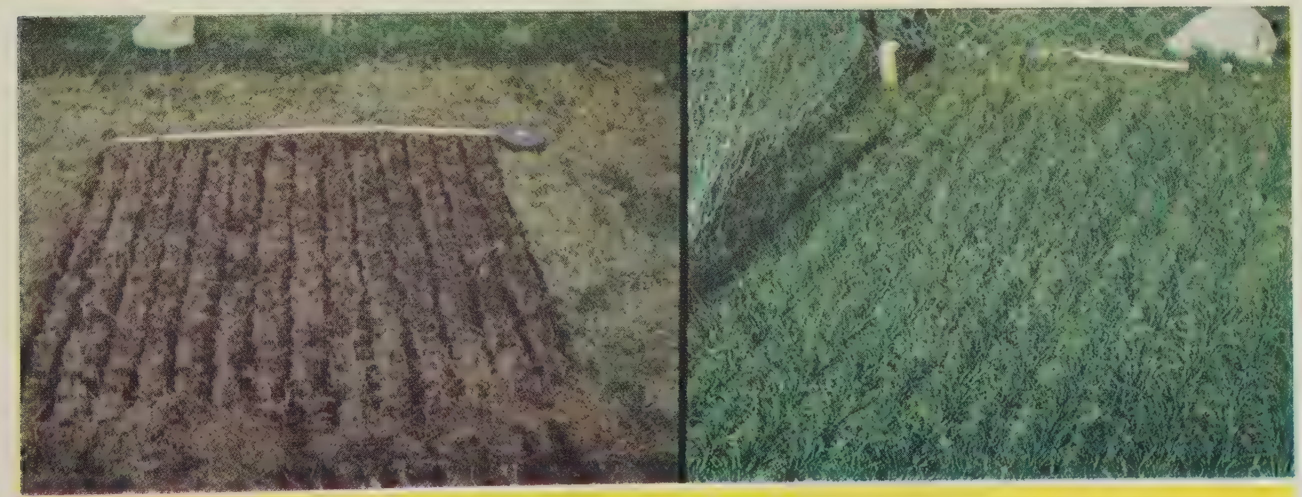
The machine, however, is a rigid one from side to side, and consequently penetration is not as even as that achieved with a disc drill. Provided the over-all width is limited to 6ft. and depth regulating wheels are used, bridging should not be excessive on country with a comparatively even surface.

Present Investigations

Something more than either the disc or penetrating point seems necessary to cope with all conditions, and thoughts are now being turned to disc plus skimmer to remove entirely the strip of turf at the top of the furrow and throw it to one side (at present under investigation at Massey College); and also to a disc plus special moulding shoe, the disc for penetrating and the shoe to mould or shape the furrow. The first-mentioned investigation appears to be showing considerable promise.

In the North Island at present there is not enough overdrilling machinery of any kind to cope satisfactorily with the situation. The machines available can be relied on to do a satisfactory job only where conditions suit the particular machine. Most of the machines are drills for which overdrilling was not envisaged and they have merely been adapted for this work. The significance of these facts must be fully appreciated. The prospect on all-grass farms of purchasing drills or special equipment essentially for overdrilling does not appeal to most farmers, and the tendency has been to look to contractors as a way out.

If special overdrilling machines or attachments are to become popular, they must not only be cheap but efficient; if drills in the higher price group are to take on, they must be efficient for multi-purpose functions. That is, they must be capable of sowing pasture by the latest precision methods, of sowing small seeds and cereals, and of overdrilling with the desired type of V furrow already described in this article.



Left—3½in. drills hand made in a chemically killed turf. The object was purely exploratory to see if a quicker and better strike and establishment could be obtained than with broadcasting. Seed and manure were hand sown in the drills. Right—The hand-sown plot of 3½in. drills about 3 weeks after sowing.

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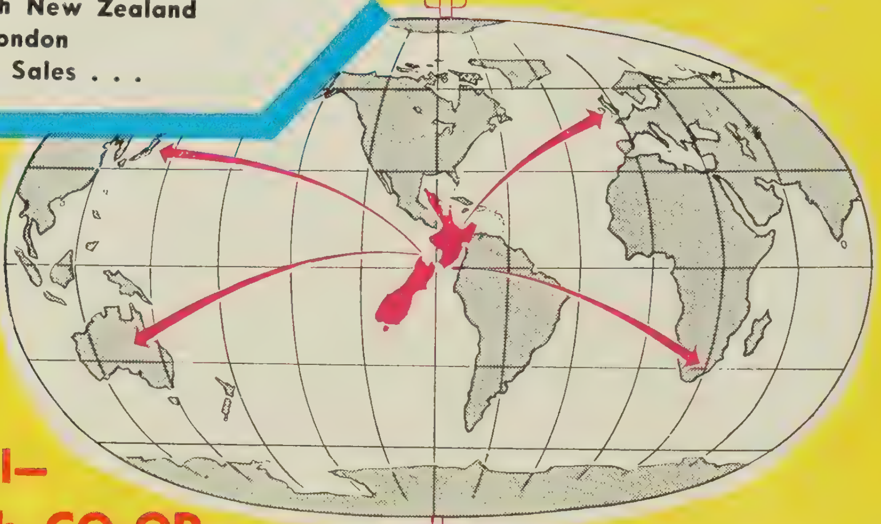

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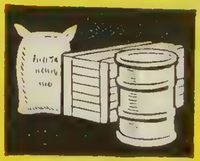

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Do you know that the total turnover of Farmers' Co-operative in New Zealand is over £56,500,000—of which £17,354,008 is merchandise?

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YOUR LOCAL CO-OP WORKS FOR YOU

The combined roller-drill-sod seeder unit (at present under investigation by Mr. M. W. Cross of Massey College) appears to offer considerable promise. Such a machine should meet with most requirements and its release will be awaited with interest.

Farmers and research workers alike are now reaching the stage where they have a much clearer conception of the underlying principles of overdrilling and the type of furrow that must be produced to establish the practice on a sound footing. This awakened interest has already resulted in the focusing of many minds on the problems involved, and development in the future is likely to be rapid.

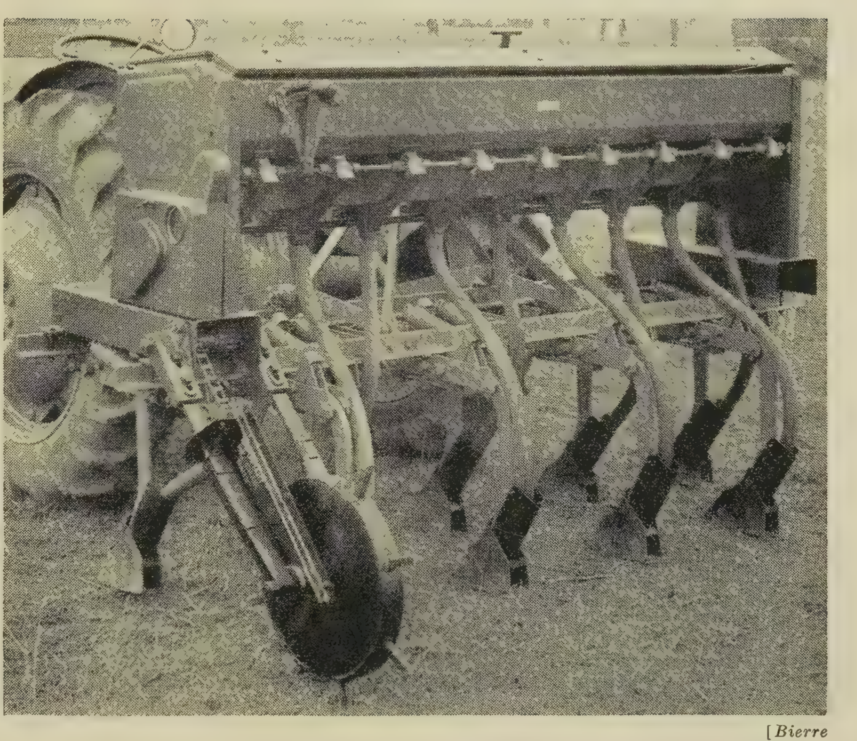
The Chemical Approach

This article would not be complete without some reference to the chemical approach. At an early stage of investigations into the problems associated with overdrilling it was realised that competition from the existing sward was likely to be a real bar to progress when dealing with the tougher types of sward, especially where browntop and paspalum had invaded. It was also realised, however, that an efficient overdrilling machine producing the desired type of furrow would go a long way toward solving this important problem.

However, to ensure that nothing was overlooked it was decided to investigate the value of chemicals in reducing sward competition. Experiments conducted in southern Hawke's Bay over the past two seasons have shown clearly that chemicals applied through a boom sprayer before overdrilling will weaken the sward in proportion to the amount of chemical applied. The most promising chemicals used were maleic hydrazide, TCA, and dalapon. Establishment from both overdrilling and broadcasting after spraying was found to be in direct proportion to the severity of check the pasture received. It was also found that the establishment from broadcasting, though not as rapid in the initial stages, was ultimately as good as that from overdrilling.

The experiments showed that where chemicals were used broadcasting of seed was the most logical method of sowing, and that the only investigation worth pursuing further, as far as overdrilling was concerned, was the value of band spraying immediately in front of each furrow opener. The advantage of this method, should it prove practicable, would be the extremely small amount of chemical required per acre. This work is to be continued.

A most valuable outcome of the experiments was, however, that where enough chemical was applied to kill the existing sward, an entirely new pasture could be established merely by broadcasting a normal pasture mixture over the surface without any cultivation.



[*Bierre*

An Australian sod seeder attached to a hydraulically mounted tiller. Note the seed and manure boxes above the tiller, the special shoes fitted to the tine points, and the land wheel at left rear which drives the seed box mechanisms.

A second important finding was that in a pasture where browntop had come in this grass could be taken out almost completely with little or no harm to the ryegrass, cocksfoot, and white clover present, and the seed introduced either by overdrilling or broadcasting established well in the spaces left by the dead browntop. The chemical used in this instance was the sodium salt of TCA at 20lb. per acre.

The treatment is not being recommended at present, as the cost is rather high and further work will have to be done to find out whether similar results can be obtained under a variety of conditions. However, it is at least of interest at present to know that such a result is possible.

The above results are of particular interest, as they appear to open up new possibilities, particularly as the application of chemicals to agriculture in this way is comparatively new.

Because spraying equipment is relatively inexpensive and is already owned by many farmers, the chemical approach to pasture renovation should be closely watched.

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Acknowledgment

To Messrs. C. C. S. Parker, S. A. McKenzie, C. Stewart, G. King, V. J. Cammock, H. Menzies, D. Welsh, and N. Vowell, on whose properties experiments were carried out; to Messrs. M. W. Cross, W. J. Burns, S. H. Henry, J. D. Wraight, and R. G. Warren for photographs; and to Messrs. H. M. Sievwright, W. L. Osborn, W. J. Burns, and R. G. Warren for assisting with experimental work.

Care of Livestock during March

Contributed by the Animal Research Division

BLOWFLY STRIKE IN SHEEP

BLOWFLY strike in sheep is likely to occur in showery autumn weather when humid conditions do not allow rapid drying of the fleece. Constant supervision is necessary to ensure that all cases are treated in the early stages. Shear the wool to leave a clean margin all round the strike. Watch carefully for narrow tracks leading to areas some distance from the original strike. Treat the affected parts with a good non-irritant dressing and be careful to collect and destroy the maggots, as if these are allowed to fall to the ground, they are capable of hatching into flies.

Jetting with preparations containing DDT, BHC, dieldrin, or aldrin will protect against blowfly strike for several weeks. An article giving detailed advice for preventing blowfly strike appeared in the October 1956 issue of the "Journal".

PULPY KIDNEY VACCINATION OF EWES

If losses from pulpy kidney are usually experienced in lambs under 6 weeks of age, they can be prevented only by vaccinating the ewes. If ewes have not been vaccinated in previous years, the first dose should be injected when they are crutched before tupping, and another dose should be injected just before lambing. Ewes which have been vaccinated in previous years require only the pre-lambing injection.

Vaccination should be done in temporary yards. Syringes should be boiled before use and needles should be kept in methylated spirit and wiped and changed each time the syringe is filled. Vaccination of ewes will not be effective in preventing losses in lambs over 6 weeks of age. Where such losses occur it is necessary to vaccinate the lambs themselves.

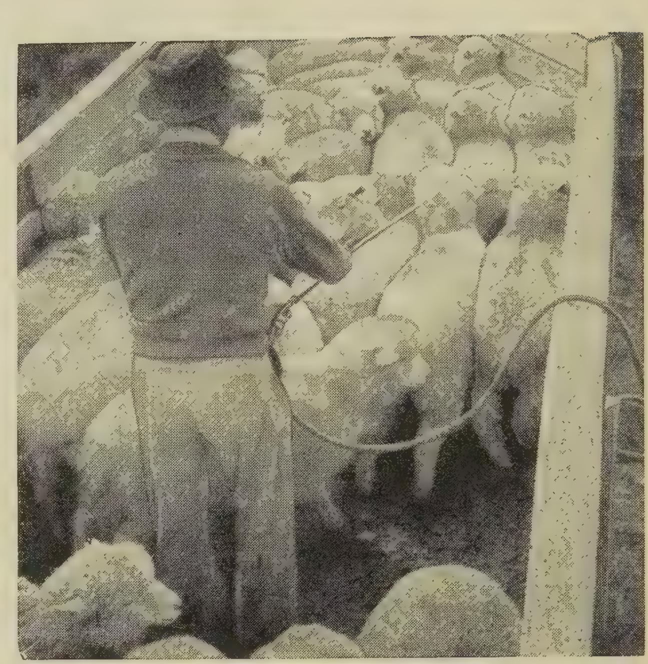
LENGTH OF LACTATION IS IMPORTANT

If dairy cows are well fed, they do not need more than 60 days' rest between lactations. Dairy Board statistics show that the average length of lactation in New Zealand is only 248 days. Production could be materially increased by milking cows longer. A good rule is to continue milking a cow while she is giving more than 10lb. of fat per month, unless she is within 60 days of calving.

CULLING OF EMPTY COWS

A cow should never be culled for sterility without being examined for pregnancy by a veterinary surgeon. Many cows thought to be empty have proved to be in calf when slaughtered at the works. The presence or absence of heat is not an infallible guide in diagnosing pregnancy. Good producers which are empty may be worth keeping, as about 80 per cent. of such cows hold when mated in the following season.

Access to good hay is particularly important for calves after the first autumn rains.



There are several proprietary preparations with which sheep may be jetted to protect them for several weeks against blowfly strike that may be prevalent in showery autumn weather.

FEED HAY TO CALVES

Calves should have access to good hay at all times. It is particularly valuable after the first autumn rains and will greatly assist in preventing the severe scouring which sometimes occurs after the grazing of lush, rapidly growing pasture. Make sure that the calves are rotated through the paddocks at intervals of a few days. Set stocking at this time of the year is bound to result in scouring, unthriftiness, and some deaths.

SLEEPY SICKNESS IN EWES

Sleepy sickness, which in some seasons causes severe losses in pregnant ewes, is due to a sudden drop in the food supply just before lambing. On many farms the only feasible way of avoiding this is by shutting up pasture in autumn for grazing by the ewes for 3 weeks before lambing. Short-rotation ryegrass is particularly valuable for this purpose, as it continues to grow during winter even in Southland.

LEAD POISONING IN CATTLE

Many cattle die from lead poisoning each year. Common sources of lead on a farm are old paint tins, discarded scraps of lead, and old batteries. These should be so buried or disposed of as to prevent cattle from having access to them. Calves frequently suffer from lead poisoning through licking painted surfaces, and care should be taken to prevent this.

Pasture Production

Seasonal Notes by the Extension Division

THE improvement and maintenance of high-producing pastures depend very largely on the clovers in the sward. In these notes the important part played by the clovers is emphasised, particularly in relation to hill country, which is now being topdressed so extensively.

AUTUMN TOPDRESSING IN SOUTH ISLAND

FOR maximum autumn pasture response phosphatic fertilisers should be applied in February. Pressure of other work may interfere with this early autumn application on some properties, but there are many who are misled by the term "autumn" and think of March and even April as the correct months for topdressing. Others are reluctant to apply fertiliser during a dry period and prefer to await autumn rains, when further delays may be occasioned by wet ground conditions.

From all points of view February is the ideal time for "autumn" topdressing. Ground and weather conditions normally favour topdressing operations and, even if growth is restricted by dryness, the fertiliser is on the ground in readiness for maximum response immediately moister conditions favour growth. Closer grazing of pastures at this period is ideal for the application of DDT mixtures where these are required for the control of subterranean grass caterpillar and grass-grub.

Topdressing in the South Island particularly should be applied sufficiently early to provide maximum response during the autumn growth period. Such promotion of healthy, vigorous clovers, improved nitrogen fixation, more vigorous grasses, and maximum root development may extend pasture production well into winter and earlier commencement of spring growth may be encouraged.

CONSERVATION OF FEED FOR FLUSHING

Flushing ewes for 3 weeks before tupping and during the first 3 weeks of tupping may substantially increase lambing percentages. Such flushing depends on an adequate supply of palatable, lush feed for the ewe flock over the 6 weeks.

Ewes should be held on restricted grazing between weaning and flushing to reduce excess condition and ensure a sharp contrast in the plane of nutrition when flushing begins. As much pasture as possible, consistent with providing adequate feed for lambs, should be closed from grazing at this stage and conserved for use in flushing the ewes. Topdressing of these areas when they are closed may increase the volume of flushing feed available later. Where a shortage of pasture is likely, supplementary greenfeed for lamb fattening, flushing, and later winter and spring feed can prove invaluable.

—*S. M. J. STOCKDILL*

* * *

SOD SEEDING OF PASTURES

MANY types of sod-seeding machines are available, ranging from expensive, precision-built equipment to simple, homemade seeders. All are giving excellent results on light soils, provided certain elementary precautions are taken. The first is to find out why the production of a pasture has fallen and to modify management, if possible, so that high-producing pasture species can thrive. Often poor results from sod seeding are due to the fact that soil fertility has not been sufficiently high to permit the introduced species to grow satisfactorily. Seeding should be done preferably on a closely grazed pasture after autumn rains have moistened the ground. In the warmer parts of the Auckland Province good results have been secured from seedings as late as May.

Rates of seeding vary according to circumstances, but usually 5lb. to 10lb. of seed per acre will be ample to thicken up the pasture. As sod seeding, in marked contrast to the older practice of oversowing after heavy surface cultivation, does not materially affect existing clovers, it is frequently unnecessary to include these in the seed mixture. A wide range of pasture species has been successfully established with the sod seeder, including all the ryegrasses, cocksfoot, crested dogstail, timothy, prairie grass, and white, red, and subterranean clovers. It is desirable to sow the seed with about 1½cwt. per acre of serpentine superphosphate or reverted superphosphate. (Straight superphosphate may cause germination injury.) The paddock should be given its normal topdressing as well.

—*A. V. ALLO*

* * *

CLOVERS ON HILL COUNTRY

TOPDRESSING hill country which has little or no good clovers in the sward is a waste of time and money, yet there are many thousands of acres of such hill country being topdressed each year at great expense and with small chance of the farmers getting much of their money back.

Too many hill country men do not yet appreciate that good clovers are important, that it is clovers which give the first response to the fertilisers, and that grasses cannot make use of the fertilisers until the nitrogen supply in the soil is built up by thriving clovers of the right type. Nor do they realise that the annual clovers and poor type of white clover which often come in with topdressing are extremely poor substitutes for either pedigree type certified white clover or a suitable type of subterranean clover in the production of more feed, especially in winter and spring, thus providing for more stock. The poor clovers are also inefficient gatherers of nitrogen from the air for the use of grasses.

On practically all types of hill country it pays to introduce better clovers by oversowing in the early stages of topdressing. It pays also to keep a close watch on developments to see whether the clovers have established well enough to warrant further topdressing before repeating applications. Not until the clovers are really well spread throughout the sward will the grasses respond. If the sown clovers are thinly scattered throughout the area, they can be thickened up by spelling during summer to let the plants flower and set seed. Where they are really thin and this method is not likely to be effective, reseeding is recommended.

Make the good clovers the keynote of the topdressing programme and do not go on topdressing paddocks which show little or no clovers of the right type.

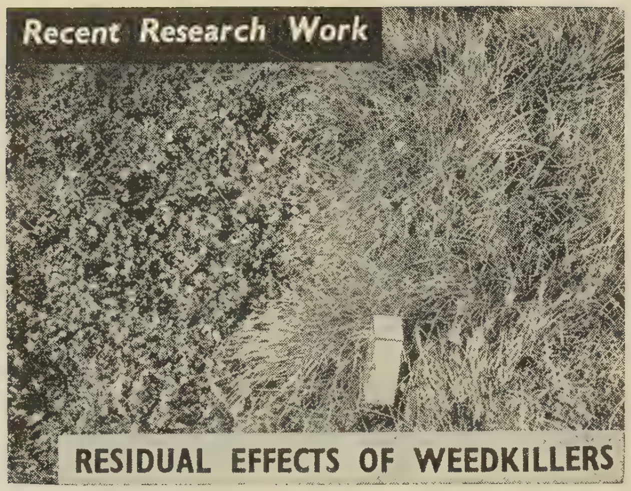
—*C. J. HAMBLYN*

* * *

ARMY WORM

LAST year damage to crops and pastures by army worm was severe in many districts. Control measures should be adopted as soon as damage is apparent. Army worms move fast, entirely devouring succulent crops and defoliating pastures and maize. Both DDT and dieldrin are effective in controlling the pest. Dieldrin gives a quick kill, but does not have as long a residual or protective effect as does DDT. For maize ½ gallon of 20 per cent. DDT emulsion in 6 gallons of water per acre is recommended for application from the air. Other crops and pastures may be treated from the ground or air with DDT at 2 pints of DDT 20 per cent. emulsion or 1½ pints of dieldrin per acre as a spray. To ensure satisfactory distribution sufficient diluent is necessary to enable a total quantity of at least 12 gallons of spray to be applied per acre.

Recent Research Work



HEADING PHOTOGRAPH: Applications of CIPC before pasture was sown prevented the establishment of ryegrass and left a pure clover sward in the left-hand plot, but in the untreated plot at right the ryegrass grew with the white clover.

RESIDUAL EFFECTS OF WEEDKILLERS

SOILS to which weedkillers have been applied may remain toxic to plants for periods varying from a few days to several years according to the type and quantity of weedkiller used. Soil type and rainfall also influence the period of toxicity. Sometimes the toxicity is selective; that is, some plants are affected and others are not. Knowing what effects weedkillers have in the soil is therefore important, and these notes describe results of trials at the Department of Agriculture's Rukuhia Soil Research Station to determine the residual toxicity of several weedkillers.

TRIALS WITH TCA AND CIPC

TCA and CIPC were each sprayed at two rates on cultivated plots in trials on both a heavy soil (Te Kowhai clay loam) and a light soil (Horotiu sandy loam). The rates were 20lb. and 80lb. per acre of TCA and 2lb. and 8lb. per acre of CIPC. Each treatment was applied to different plots in October, November, and December. Two days after the December applications all plots were sown with a mixture of 30lb. of perennial ryegrass and 3lb. of white clover per acre. Rainfall in the 2 months from the October application to the sowing in December was 5½in. and a further 4in. fell in the 7 days after sowing.

RESULTS WITH TCA

A normal ryegrass-white clover sward, similar to that on the untreated, control plots, became established on all plots to which TCA had been applied except where 80lb. was applied 2 days before sowing. Even this treatment had little effect on the pasture sward; there was a slight reduction of ryegrass on the light soil and of clover on the heavier soil. TCA is soluble and presumably the heavy rain which fell several days after sowing leached it out of the top layers of soil before it had much effect on the seedling ryegrass and clover.

EFFECTS OF CIPC

The residual effects of CIPC were more spectacular, particularly on the heavy soil. A pure white clover sward without a trace of ryegrass became established on most of the treated plots. Applications of 8lb. of CIPC at each of the three times and the 2lb. application in December completely inhibited ryegrass on both soil types. On the heavy soil there was a slight trace of ryegrass when 2lb. was applied in October, but none after the November treatment. Ryegrass became established on the light soil when 2lb. of CIPC was applied in October and November, but compared with the results in untreated plots, it was slightly and severely reduced respectively.

Three weeks after sowing there was very much less seedling white clover on the CIPC plots than on the untreated or TCA plots, particularly where the CIPC was applied immediately before sowing. Even when applied 2 months previously the 8lb. treatment had severely reduced the clover. However, 3 months later there was luxuriant, dense growth of white clover on all the CIPC plots except where 8lb. was applied immediately before sowing. On these plots there was some bare ground and slightly less clover. From these trials and recent experiments at the Department's Seed-testing Station, Palmerston North, which showed that CIPC reduced the germination of white clover, it is assumed that the good clover swards largely resulted from the late germination of hard seeds and that because there was no competition from grasses, any clovers which survived the CIPC made vigorous growth.

PRE-EMERGENCE APPLICATIONS OF CIPC AND MONURON

Further information on the residual toxicity of CIPC and the toxicity of low rates of monuron (formerly called CMU) was obtained from trials in which various rates of these materials were applied as pre-emergence weedkillers with different crops. The duration of the residual toxicity varied according to the weather. Some of the trials were in dry seasons and the stage at which the weeds infested the treated plots depended on when there was sufficient rain to germinate weed seeds after the toxic effect of the weedkiller had worn off.

CIPC at 2lb. per acre or less did not give good weed control even for short periods. Applications of 4lb. kept the ground free of weeds for about 5 or 6 weeks, but after 8 weeks there was some reinfestation of weeds. CIPC at 8lb. per acre gave good weed control for 8 weeks or longer.

Rainfall also had a marked effect on the toxicity of CIPC to onions. In a dry season 6lb. had no adverse effect, but under high-rainfall conditions lower rates killed most of the onion seedlings. A pre-emergence application of 2lb. of CIPC in April 1956 had, within 3 weeks, reduced the number of onion seedlings to 65 per cent. of the untreated controls, and at 16 weeks the figure was 22 per cent. Higher rates of CIPC caused more damage. The rainfall that season was exceptionally high. In the first 3 weeks after the CIPC was applied it was 8in. and a further 24in. had fallen at the end of 16 weeks.

RESULTS WITH MONURON

The residual effect of monuron, like that of CIPC, varied according to the rainfall and the season. When the two materials were each applied at rates normally tolerated by vegetable crops, the period of general toxicity to weed seedlings in the surface layers of the soil was much longer with monuron than with CIPC. However, the otherwise good weed control obtained with monuron was often spoilt by the tolerance of certain weeds, such as paspalum, plantain, ribgrass, and scarlet pimpernel, to monuron. If the experiments were conducted when and where these species normally germinated, the plants frequently appeared at an early stage on plots treated with monuron when the soil was still too toxic for the survival of most germinating weeds. These variable factors make it difficult to summarise results, but generally rates of 1½lb. to 4lb. per acre of monuron have given good weed control for 10 to 16 weeks.

In the high rainfall of autumn 1956 monuron was also very toxic to onion seedlings. Pre-emergence applications of 1½lb. and 3lb. both killed 75 per cent. of the onions in 16 weeks.

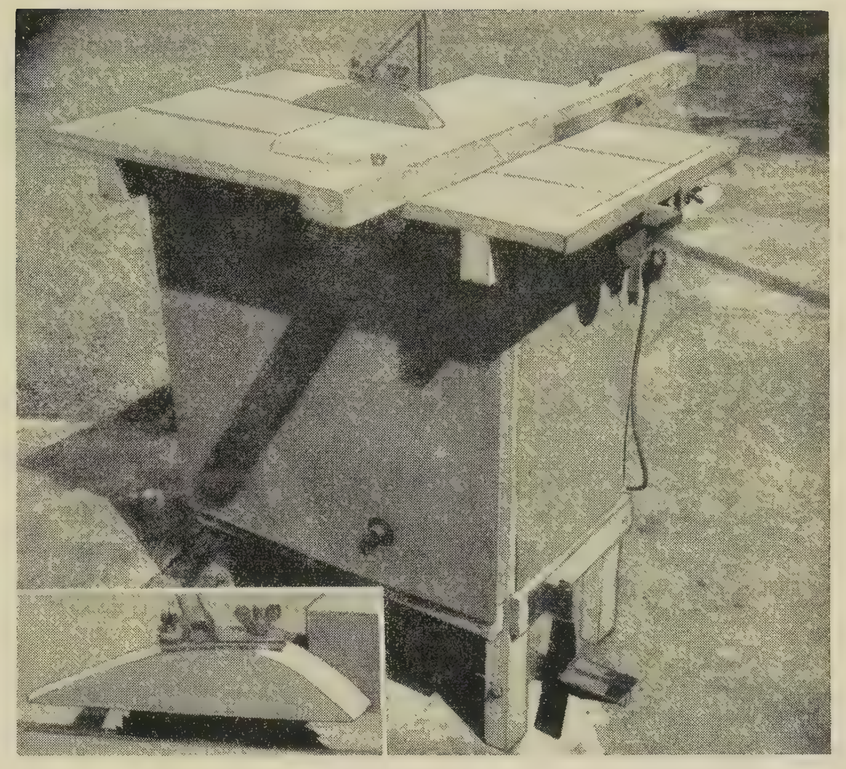
CONCLUSIONS

A high rate of TCA, 80lb. per acre, which normally would be very toxic to seedling grasses had very little effect when very heavy rain fell a few days after the TCA was applied. Therefore adverse weather could easily cause poor results with the smaller quantities recommended for specific weed problems, that is, up to 15lb. per acre for the control of barley grass or 20lb. per acre for weed control in brassica crops.

—*F. B. THOMPSON*

Beekeeper's Saw Bench

THIS article by C. R. Paterson, Apiculturist, and A. W. Bennett, Apiary Instructor, both of the Department of Agriculture, Hamilton, describes the construction of a saw bench suitable for the production of all wooden hive parts, and also gives much useful information on stacking timber, types and care of saws, and methods of operating a saw bench with maximum safety. A bench of this type could also be very useful for making household furniture or for maintenance work for farm buildings.



The saw bench, showing the sides enclosed with plywood panels and with a safety catch for the foot control pedal. The operator should stand slightly to one side of the line of saw travel if he uses his right foot to control the pedal. Inset—The hood guard encloses the saw on both sides as required by the Department of Labour's Woodworking Machinery Regulations.

THE commercial beekeeper, even if he buys most of his hive equipment, will always find a use for a saw bench. Though a beekeeper would have some satisfaction in being the owner of one of the many very good saw benches now on the market, he would find that most of them will not do all the operations required in the making up of hive parts from board timber. The ordinary saw bench will not allow accurate cutting off of short lengths of timber from long boards. Though special saws are available for doing this work, it is not considered desirable that too much capital should be tied up in equipment which is used for only short periods of the year.

The saw bench described in this article is designed to give the beekeeper equipment that will handle practically all his sawing jobs, even to cutting off accurately the long lengths of timber. The main points about this bench are:—

1. A solid, fixed table of suitable size.

2. The saw is fitted on to a swinging arm and is operated by a foot pedal when crosscutting long boards.

3. For normal sawing the swing arm is held in a fixed position.

4. An adjusting screw moves the saw up or down in the table. This takes the place of the rise and fall table top and gives very accurate adjustment in the height of the saw. When the adjusting rod is disconnected the saw assembly is free to move on the pivot bearings and the saw is then controlled by the foot pedal.

CONSTRUCTION

Frame

Four pieces of good straight timber each 34in. long and dressed to about 2¾in. x 1¾in. are used for the legs of the bench. This keeps the bench top at a very good working level and eliminates fatigue if several days of constant work are required.

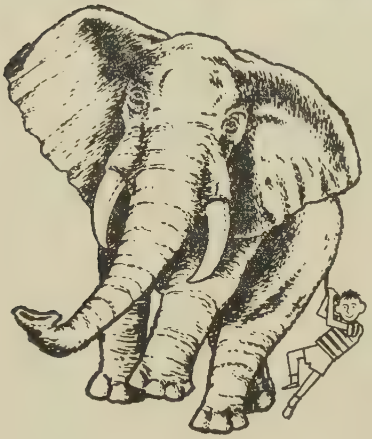
To hold the legs together at the top four pieces of angle iron are required: Two pieces 27½in. long of 1in. x ⅛in. (A in upper left diagram on page 135) and two pieces 23in. long of 1½in. x ⅛in. (B in upper left and lower left diagrams on page 135).

When boring the holes in the ends of this iron make sure the holes in the 1½in. angle iron are in such a position as to miss the bolts used in the 1in. angle iron. If this is not done, the two bolts will not go into each leg; 5/16in. bolts can be used. Use engineer's bolts with the hexagonal head if procurable.

The toe of the operator's shoe releases the safety catch on the downward movement of the foot to make the cut.

When the foot is lifted the safety catch again secures the foot pedal.

What's holding it back?



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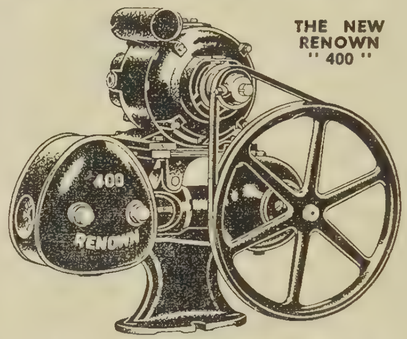

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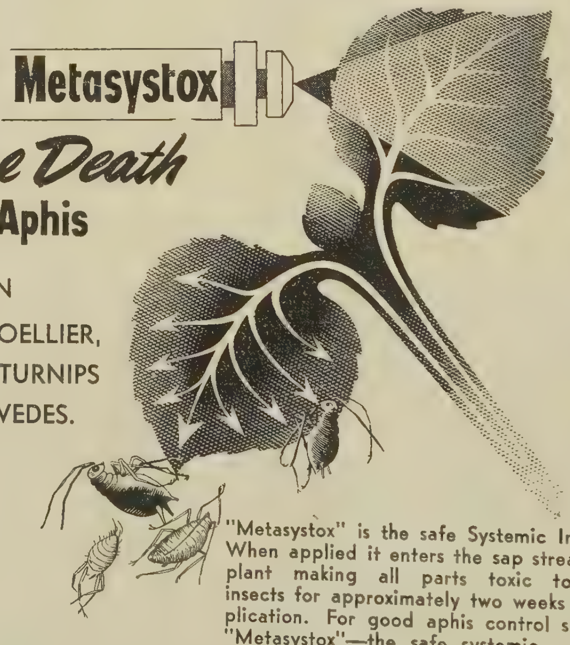

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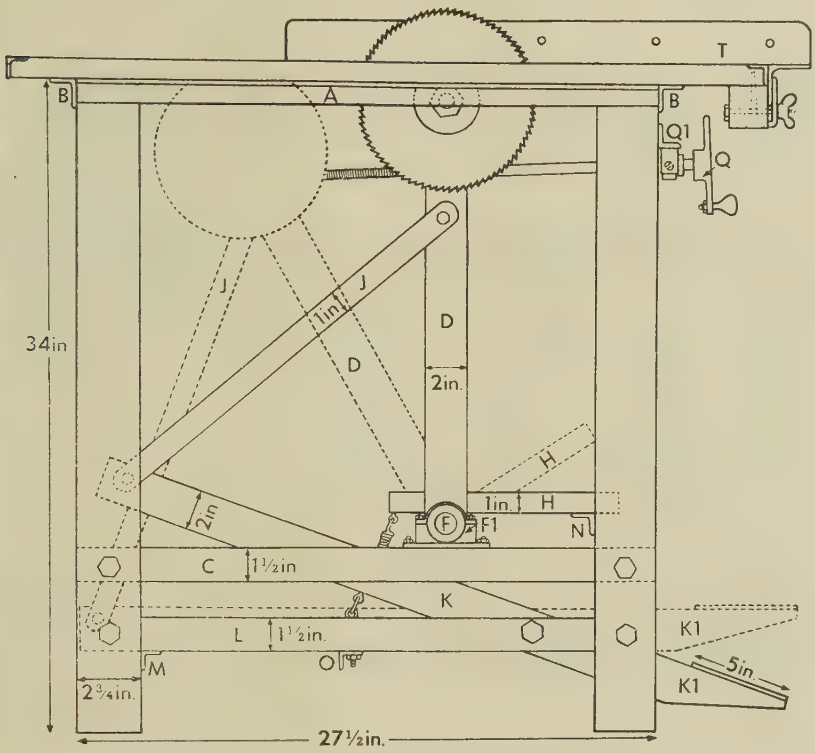
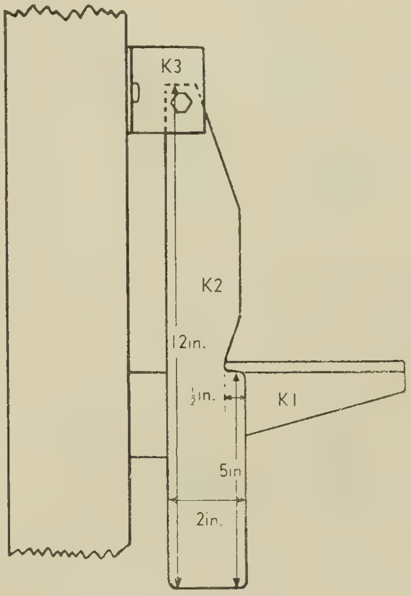
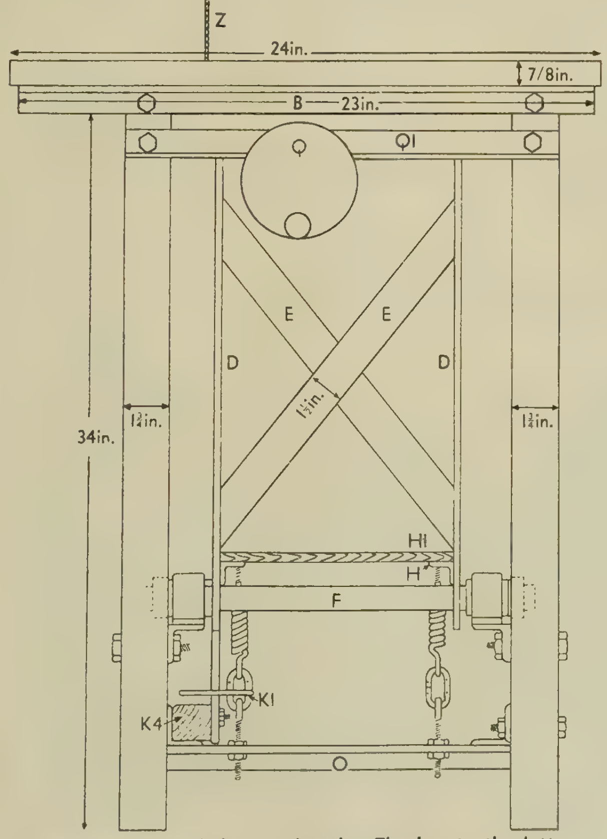


Side elevation of the saw bench. The key to the letters is in the text, excepting T, which is the metal frame for holding various wood fences.



Safety catch for foot control pedal to conform with safety regulations. K1—Foot pedal. K2—Safety catch. K3—Angle bracket. The safety catch is made of 2in. x ¼in. flat iron.



Front elevation of the saw bench. The key to the letters is in the text.

Four pieces of 1½in. x ⅛in. angle iron (C and L in diagram above left) can now be cut 27½in. long and drilled with a 5/16in. hole, 1½in. from each end. They fit on the lower portion of the legs and support the saw assembly. These cannot be placed in position until later in the construction.

Saw-spindle Assembly

The first need for the saw-spindle (Z1 in the two upper diagrams on page 137) assembly is 50in. of 2in. x ¼in. flat iron (D in diagrams at upper left and at left on this page and at upper left on page 137). This should be neatly bent at right angles to give a base of 10in. and each side piece 20in. To keep this frame perfectly rigid use two pieces of flat iron 1½in. x ¼in. and 18in. long (E in diagram at left and upper diagram on page 137). These will require to be cut accurately to the correct angle and electric welded into position as shown in the drawing. This frame should line up perfectly when looked at from all angles.

Two 1in. holes are now drilled 18½in. from the top to take the 1in. pivot shaft (F in diagrams upper left and at left). It is sometimes better to drill these holes ⅞in. and take the rest of the metal out with a round file. In this way the shaft can be fitted more accurately. When this is done the shaft can be placed in position with about equal lengths protruding from each side of the frame. Weld the shaft on to the frame from the inside. The pivot bearing is F1 in the diagram at upper left on this page.

Two pieces of 2in. x ¼in. x 4in. flat iron (G in the top diagram on page 137) can now be welded to the top of the frame, care being taken that they are in the correct position for the saw spindle to bolt on to and that the saw will be about ⅜in. from the frame.

Two pieces of 1in. x ⅛in. angle iron (H in the diagrams at upper left and left on this page and the upper diagram on page 137) 12in. long can now be bolted to the inside of the frame just above the pivot shaft. These are bearers for the platform (H1 in diagram at left) to take the electric motor.

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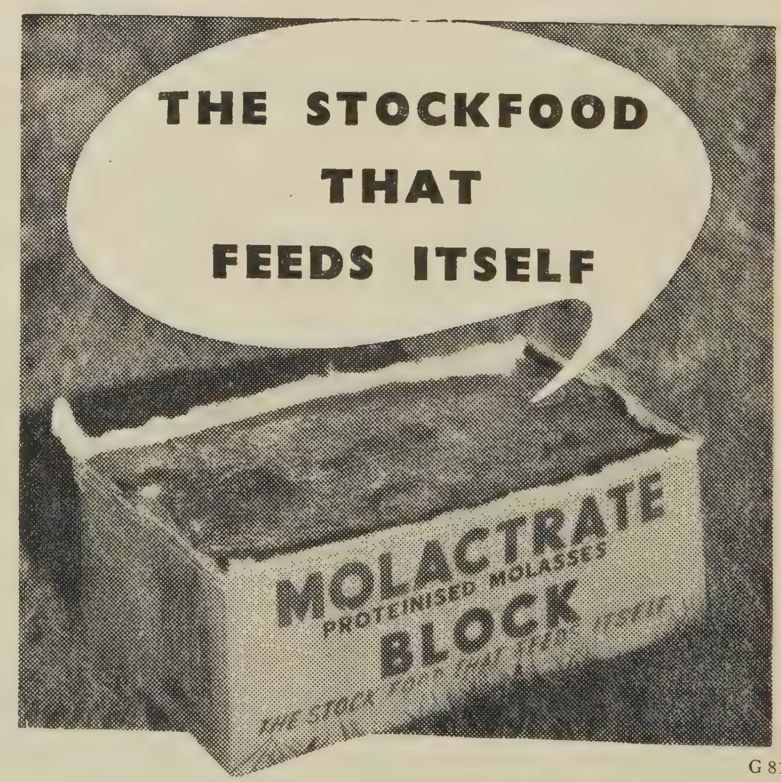
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The saw spindle can now be bolted on to the frame. When buying the spindle make sure that the shaft for the saw is long enough to take a set of dado cutters; also that the other end is suitable for taking a boring chuck. The spindle should have a left hand thread and is bolted on to the frame as shown in the upper diagram at right, care being taken that the shaft is in line with the pivot shaft (F) at the bottom.

Two 1in. bearings and collars are now required to support the saw-spindle assembly.

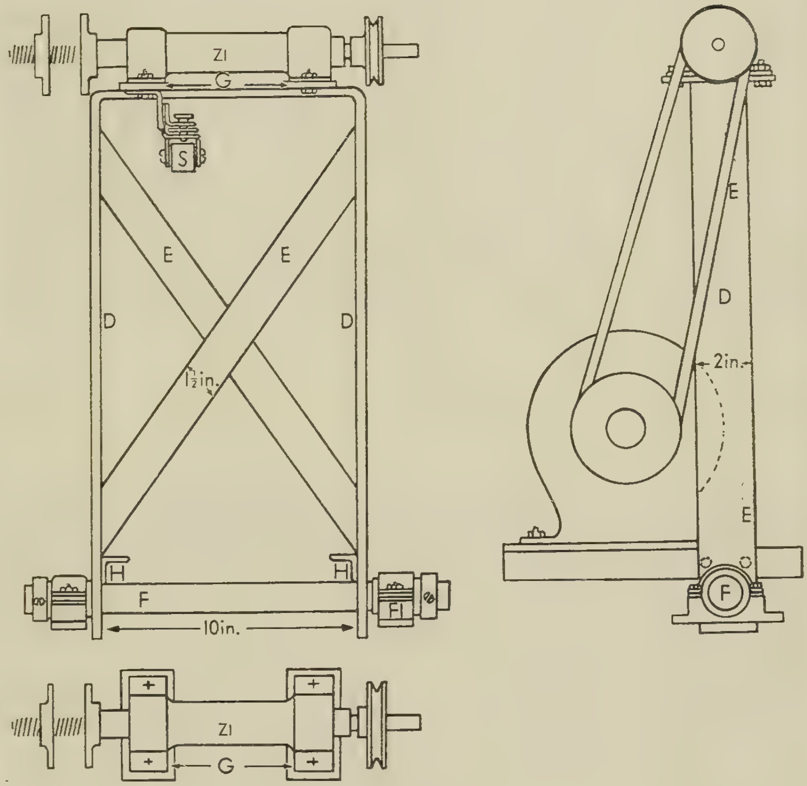
Rapid progress can now be made with the general assembly of the saw bench. Using four G cramps, place the 2 pieces of angle iron C (upper left diagram on page 135) in approximate position on the lower part of the wooden legs. The bearings on the pivot shaft should now be placed in position and the angle iron adjusted until the saw spindle will allow about 2¼in. of an 8in.-diameter saw to protrude above the bench table. It will be found that to do this it is generally necessary to cut away under the table to allow room for the collars holding the saw. Once the correct height has been found and the two angle pieces C have been lined up for level the holding holes in the legs can be bored.

Before removing the cramps position the bearings so that the centre of the pivot shaft is 10in. from the front edge of the legs. When iron is being marked it is sometimes best to rub chalk over the likely position and then use a sharp nail or scriber for scratching the correct position of the holes. The bearing blocks generally have slotted holes for final adjustment, back or forward.

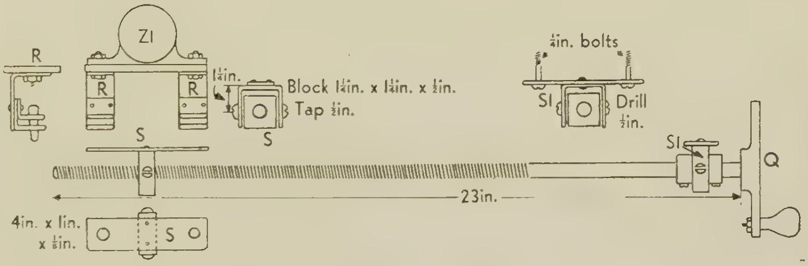
The foot control pedal and rocker arms are now assembled into place. Two pieces of 1in. x ⅛in. flat iron, 20in. long (J in the upper left diagram on page 135), are drilled with a ¼in. hole ½in. from each end. Another piece of flat iron 2in. x ¼in. x 34½in. (K in same diagram) is drilled with a ¼in. hole 1in. from one end. The other end is cut away to form a foot control pedal (K1) as shown in the drawing and a foot plate is welded on the top or two pieces of angle iron can be bolted together; 13in. from this end bore a ½in. hole to take a pivot pin. The supports for this assembly are the two pieces of 1½in. x ⅛in. angle iron, 27½in. long (L). A ½in. hole drilled 6in. from the front and in the same face as the holes previously described in L should give the correct position for the pivot pin, but it would be best to check this measurement before drilling. The pedal is required to bring the saw spindle assembly into an erect position to get the maximum cut from the 8in. saw.

To bring K out into correct alignment with the rocker assembly (D) a block of wood (K4 in lower left diagram on page 135) is used which has a ½in. hole bored in it and which rests on the angle iron as shown in the drawing.

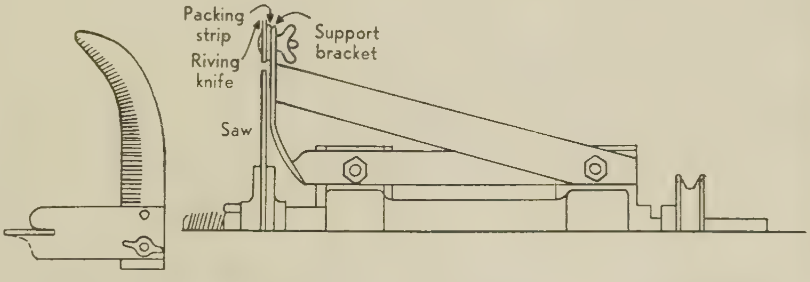
BEEKEEPER'S SAW BENCH



Left—The saw spindle mounting. Right—The motor mounting. See text for key to letters.

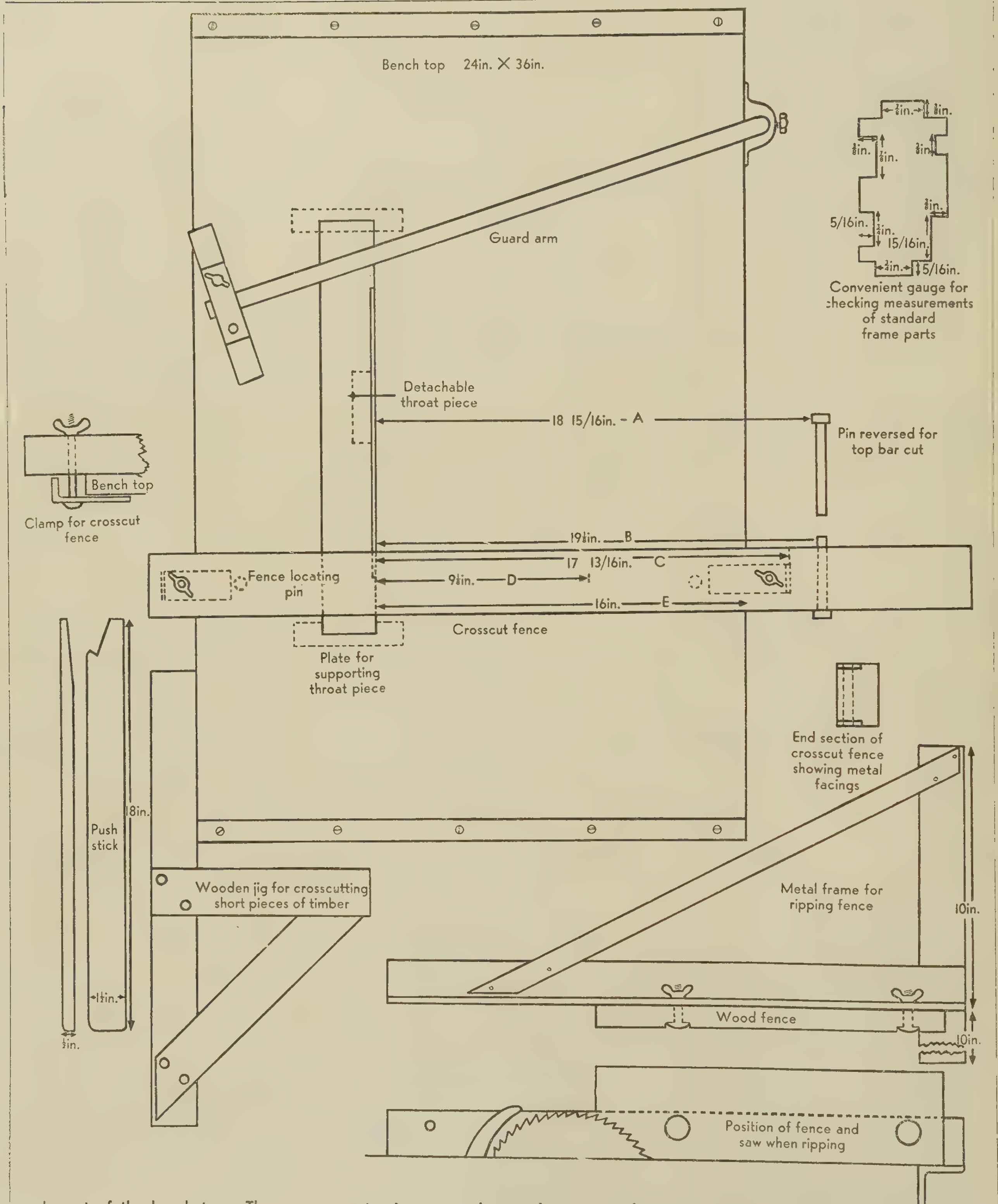


The saw adjustment assembly. See text for key to letters.

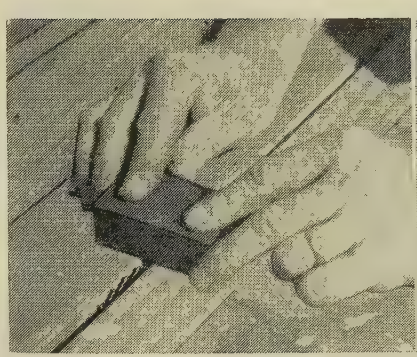


Method of fitting the riving knife to the saw assembly. To avoid confusion part only of the riving knife is shown above the saw.

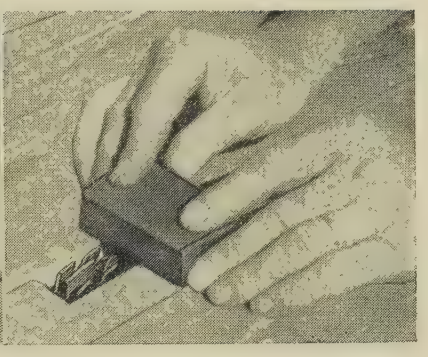
LAYOUT OF BENCH TOP


Bench top 24in. X 36in.
Guard arm
⅞in.
⅜in.
⅜in.
⅞in.
⅜in.
⅜in.
5/16in.
¾in.
15/16in.
¾in.
5/16in.
Convenient gauge for checking measurements of standard frame parts
Detachable throat piece
18 15/16in. - A
Pin reversed for top bar cut
Bench top
Clamp for crosscut fence
19⅛in. B
17 13/16in. C
Fence locating pin
9⅛in. D
16in. E
Crosscut fence
Plate for supporting throat piece
End section of crosscut fence showing metal facings
18in.
Push stick
1½in.
½in.
Wooden jig for crosscutting short pieces of timber
Metal frame for ripping fence
10in.
Wood fence
10in.
Position of fence and saw when ripping

Layout of the bench top. The measurements given on and near the crosscut fence are guides for making the following hive parts. A—Top bars. B—Box sides. C—Bottom bars. D—Side bars. E—Box ends. Further information on measurements of hive parts is given in Department of Agriculture Bulletin No. 267, "Beekeeping in New Zealand".



Jointing a saw. Bring the saw level with the bench top and then push the stone forward over the moving saw.



For trimming cutters the chipper blades are spaced evenly round the spindle. Keep a firm grip of the stone and slide it slowly forward over the revolving cutters.

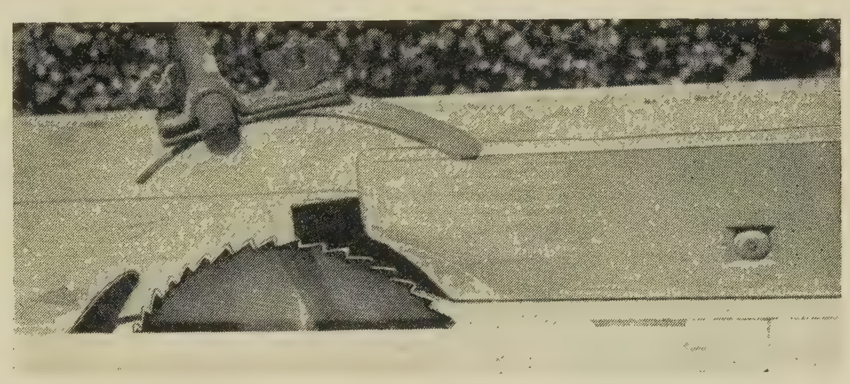
To comply with the Department of Labour's safety regulations a safety catch is fitted to the foot pedal as shown in the upper right diagram on page 135.

When the saw will move forward freely when foot pressure is applied and will line up correctly, two pieces of 1in. x ⅛in. angle iron (M and N in diagram at upper left on page 135) 17½in. long are placed in position. The front stop (N) should allow the saw to come forward about 1½in. past top centre, and M should allow the saw to retract below the bench top.

When fitting the ½ h.p. motor endeavour to get it in as close to the pivot shaft as possible, and make sure the pulley correctly lines up with the pulley on the saw spindle.

To counterbalance the weight of the motor when the saw is coming into the vertical position two strong coiled springs are required. They can be about 2in. to 3in. long with a coil about 1in. in diameter. They are connected to the appropriate eye bolts with split links. This arrangement allows the springs to collapse completely when the saw is below the table top, but to come into action when the saw is coming forward. Nuts on the bottom eye bolts give any adjustment that may be necessary. These are fixed to a piece of 1in. x ⅛in. angle iron, 13½in. long (O in the upper left and lower left diagrams on page 135).

Though the foot pedal moves the saw forward when long lengths of timber are being crosscut, some arrangement has to be made to hold the saw in position for normal saw-bench work. This is done by the saw adjustment assembly shown in the middle diagram on page 137.



The correct position of the ripping fence in relation to the saw. In this photograph the saw has been lowered and the wooden fence brought forward on the metal frame to correspond. The hood guard shown in the illustration on page 133 should be used instead of the guard shown here.

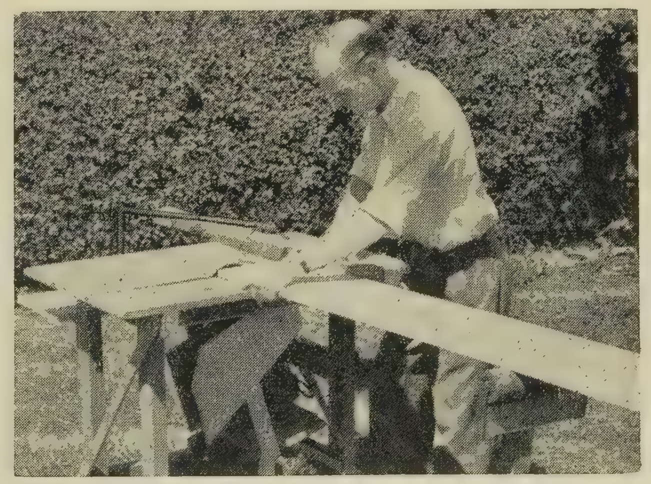
A piece of ½in. steel shafting 23in. long is threaded for about 12in. to 14in. of its length. The threaded end fits into a universal block (S) as shown in the drawing. The other end fits into a similar block (S1) with a ½in. hole and a collar each side. At the end is a plate or wheel for the turning handle (Q). S1 is fixed to the angle iron Q1 (upper left diagram on page 135) by two ¼in. bolts.

The two fittings R are secured underneath the saw spindle (Z1) on the bolts nearest the saw. The assembly is made perfectly rigid by slipping S in between the two pieces of angle iron R and dropping in the two tapered pins. Any movement of the saw spindle is now done by the adjusting wheel, which takes the place of the rise and fall table.

Saw-bench Top

Three pieces of 8in. x ⅞in, x 36in. dressed timber are required for the saw-bench top. A sheet of ¾in. resin-bonded plywood could be used if procurable. The first board is fixed to the angle iron cross pieces just clear of the inside of the saw. Another board is placed next, and the third piece goes on the other side of the saw after the space for the throat piece has been cut away. For holding the boards on to the metal frame 3/16in. bolts with countersunk heads can be used.

The throat opening should start 10in. from the front and extend for 20in. with a width of 2½in. To support the various throat plates used, two metal strips are screwed



Crosscutting a long board, using a rest to support the board. The board is held firmly on the bench top and back against the fence. There is a boring table on the far side of the bench. The protective sides required by the regulations to enclose the working parts have been removed to show a dust chute fixed to the rocker arm.

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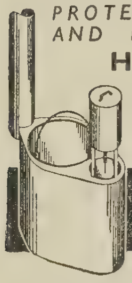

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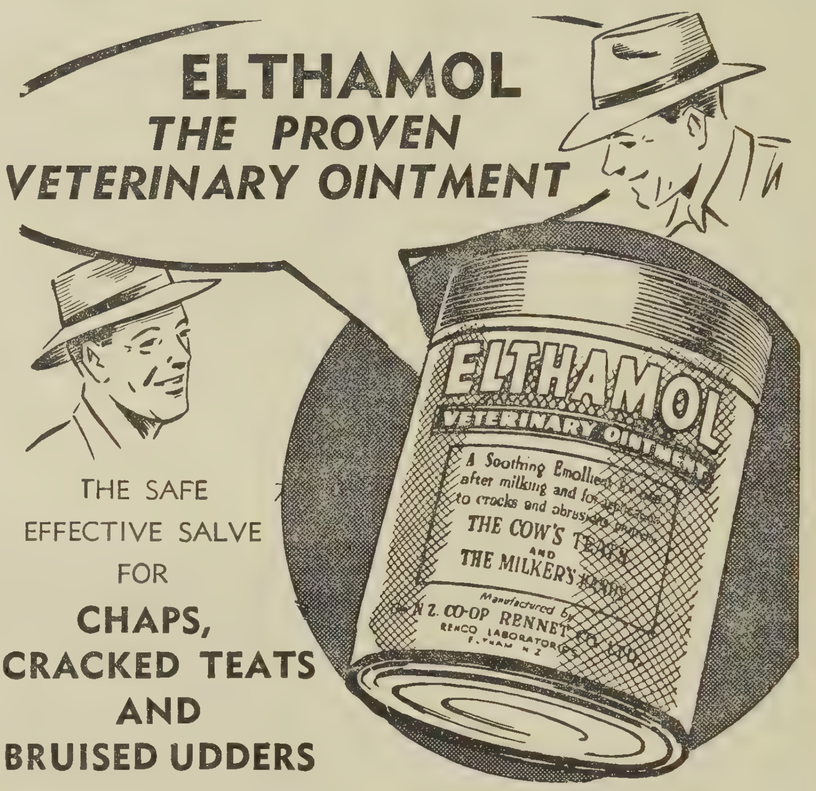
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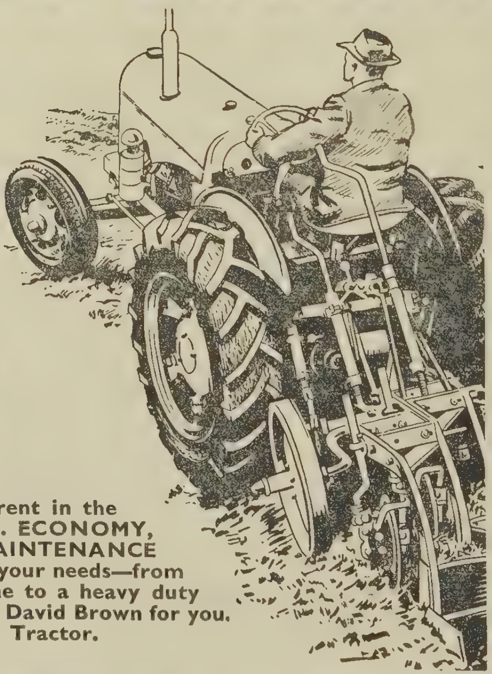

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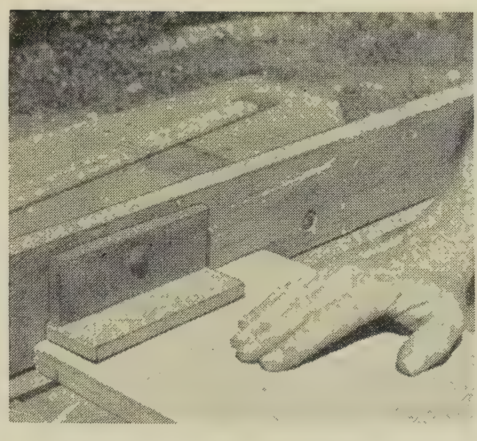
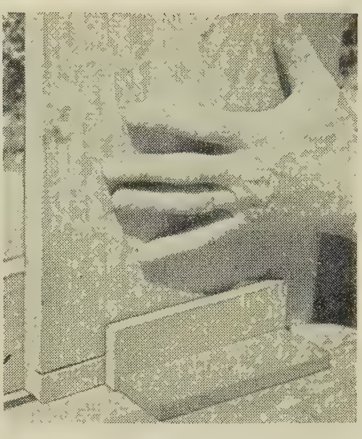
underneath the ends of the opening, care being taken that they are clear of the saw.

Crosscut Fence

The crosscut fence should be left until the last when the bench can be used for rabbeting out the recess for the iron strips to be fitted on the fence. Take a piece of 2¾in. x 1¾in. dressed timber about 3ft. long and on the 1¾in. edges cut recesses for taking 1in. x ⅛in. flat iron on each side. For the edge to be placed next to the saw the iron is cut into two lengths, one piece 25in. and the other 10½in. This will leave a gap of ½in. for the saw to come up to. On the other edge the iron is in one piece, 36in. x 1in. x ⅛in. Screw these on with countersunk screws, making sure none comes near where the holes for the cutting-off pin or stop will be bored. When the saw is forward as far as possible make a mark on the bench top where the depth of cut will be 1½in. Now lower the saw to clear this mark, place the fence in position (making sure the gap between the two pieces of iron is in line with the saw and on the 1½in. mark), clamp the fence lightly, and set it so as to be at right angles to the saw. Recheck the position and clamp the fence tightly. Now bore two ⅜in. holes in the fence and through the bench top to come about 2in. from each edge of the top.



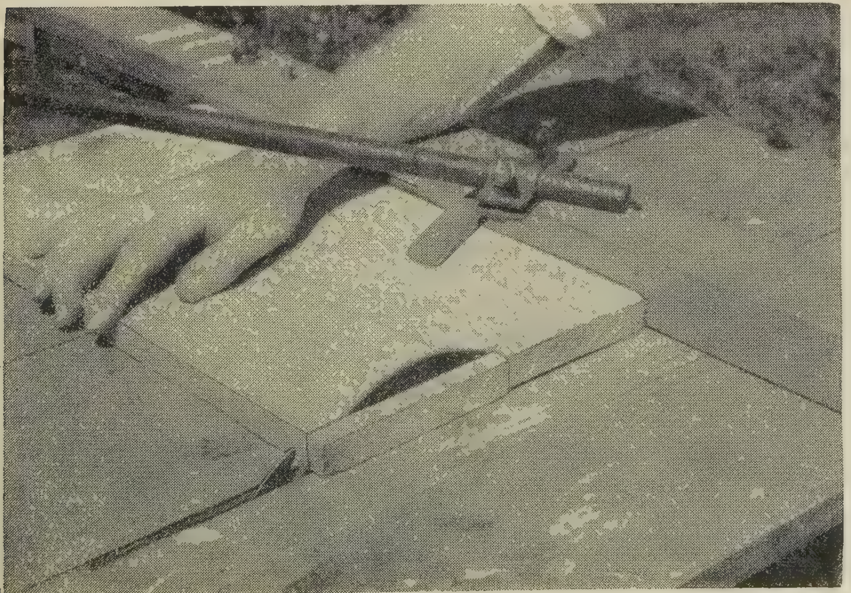
Rabbeting the end of a super. The wooden guard is just clear of the board and completely covers the saw. The timber is held firmly in the left hand and pushed with the right hand.



Second cut: The wooden guard is now fixed to the bench top. The left hand keeps the board steady and back to the fence while the right hand pushes it forward. The off cut is always to the outside.

Two pieces of ⅜in. dowelling about 2¼in. long are now glued into the fence, the ends being left flush with the top. The projecting pieces on the under side should be rounded off so that the fence will readily fit into place over the positioning holes. End clamps as shown in the diagram on page 138 can now be fitted. Now run the saw up into the fence. Remove the saw and from this cut measure out the various standard lengths for all hive equipment as shown in the same diagram. Note that the measurement must be from the edge of the cut to the contact edge of the ⅜in. cutting-off pin. This means that the centre punch marks for drilling, which should be well made, will be the length required plus 3/16in. When they are marked, recheck, as it is essential that these distances be accurate, as they are the standard for all cuts. Use a small drill first, before using the ⅜in. drill. The holes go right through the two pieces of flat iron.

The making up of the fences and guard should be easily followed from the drawing.



Crosscutting a short board. The timber is held firmly to the marker pin for length and the saw is brought forward by the foot pedal.

When the electrician is wiring up the electric motor, have the switch placed in a handy position on the bench. This can be on the front left-hand leg just underneath the bench top.

A chute made of metal or hardboard is necessary to keep the sawdust off the motor. This is fitted on to the saw spindle frame D. A temporary fitting can be seen in the bottom illustration on page 139.

If the saw spindle is going to be used for boring or dowelling, a suitable shelf can be fitted on the side of the bench with two metal brackets. Boring height is controlled by the saw adjustment spindle.

To comply with the Department of Labour's Woodworking Machinery Regulations it is necessary to enclose the sides of the bench as shown in the upper illustration on page 133. The material used can be metal, hardboard, plywood, or strong wire screen. Screws should be used for fixing the material to the frame.

A saw bench of the above type, though it has been designed to meet beekeepers' requirements, can be used for home furniture joinery. One has also been used in the construction of a house, including all window joinery and inside fittings.

Material Requirements

Timber

4 lengths 34in. long, dressed, 2¾in. x 1¾in. (legs)

3 lengths 36in. long, dressed, 8in. x ⅞in. (bench top)

1 length 40in. long, dressed, 3¾in. x ⅞in. (fences)

1 length 66in. long, dressed, 2¾in. x ⅞in. (throat plates)

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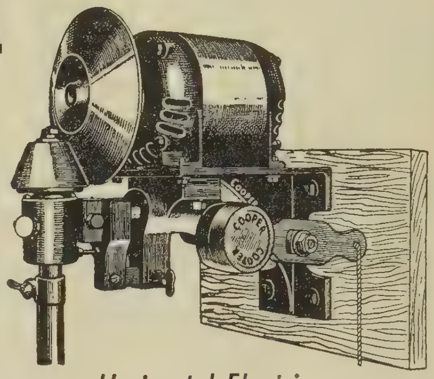

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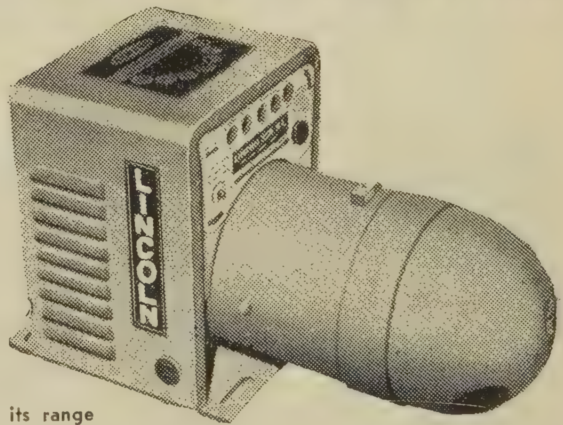

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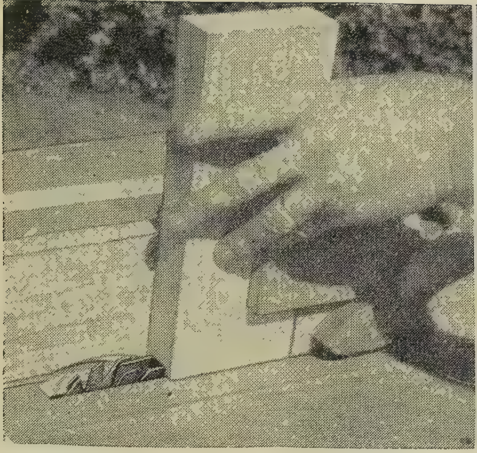


A slide bar block being grooved at the ends with dado cutters. The jig only is withdrawn.

The jig used for shaping side bars. For this work the operator should sit at the side of the bench and push the jig forward with the right hand. The procedure was reversed here to enable the photograph to be taken.

Iron

Angle iron—

A 2 lengths 27½in. long 1in. x ⅛in.; 5/16in. hole 1½in. from each end
B 2 lengths 23in. long 1½in. x ⅛in.
C and L 4 lengths 27½in. long 1½in. x ⅛in.
H 2 lengths 12in. long 1in. x ⅛in.
M and N 2 lengths 17½in. long 1in. x ⅛in.; 5/16in. hole 1in. from each end
O 1 length 13½in. long 1in. x ⅛in.; ¼in. hole ¾in. from each end
P 2 lengths 24in. long 1in. x ⅛in.; six 3/16in. holes to match bench top
Q 1 length 17½in. long 1½in. x ⅛in.
1 length 20in. long 2in. x ⅛in. (ripping fence)
1 length 25in. long 2in. x ⅛in. (ripping fence)

Flat iron

2 lengths 5in. long 1in. x ⅛in. (to hold throat plate)
2 lengths 36in. long 1in. x ⅛in. (crosscut fence)
1 length 25in. long 1in. x ⅛in. (ripping fence brace)
D 1 length 50in. long 2in. x ¼in. (rocker arm)
E 2 lengths 18in. long 1½in. x ¼in. (rocker arm cross braces)
G 2 lengths 4in. long 2in. x ¼in. (top rocker arm)
J 2 lengths 20in. long 1in. x ⅛in.
K 1 length 34½in. long 2in. x ¼in. (¼in. hole 1in. from one end and ½in. hole 13in. from other end)

Shafting

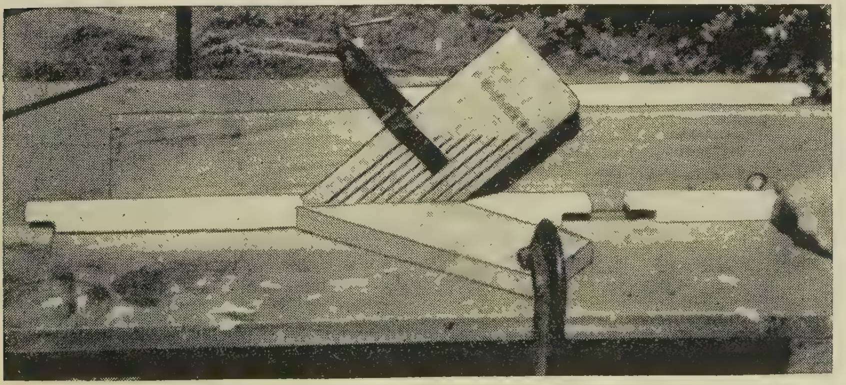
F 1 length 16in. long 1in.-diameter steel shaft (to pivot rocker arm)
1 length 23in. long ½in.-diameter steel shaft (adjusting screw)
1 length 32in. long ½in.-diameter iron shaft (saw guard support)

Bolts

12 engineer's bolts 2½in. x 5/16in.
10 engineer's bolts 3½in. x 5/16in.
1 engineer's bolt 3½in. x ½in.
12 engineer's bolts 1in. x 5/16in.
24 countersunk bolts 1¼in. x ¼in.
24 countersunk bolts 1in. x 3/16in.

Approximate price of iron (cut to size) and bolts: £4 6s.

Equipment	Approximate price £	s.	d.
1 ½ h.p. motor	14	0	0
1 A section V pulley, 4in. diameter, cast iron, fits motor ..		10	0
1 A section V pulley, 2½in. diameter, cast iron, fits saw spindle		9	0
2 1in. bearings or plummer blocks	1	6	0
1 A section V belt 27in.		8	6
Saw spindle to take dado cutters	5	2	6
1 8in. crosscut saw	1	2	0
1 8in. rip saw	1	2	0
1 set 6in dado cutters (optional)	10	10	0



Grooving top bars: The feather guides, just gripping the bar, are held in position with G cramps. The feather guides are made of 8in. x 4in. x ¾in. timber.

SAWS

Sawing of timber has become a very highly skilled trade, and as can be expected with a greater variety of jobs being done on the bench various types of saws and saw-teeth shapes have developed, each saw being used only for its particular job and each tradesman having his own modified idea of teeth shape. The beekeeper, however, will need only saws of a standard pattern, namely, the crosscut, rip, dado cutters, and possibly a combination saw.

Care of Saws

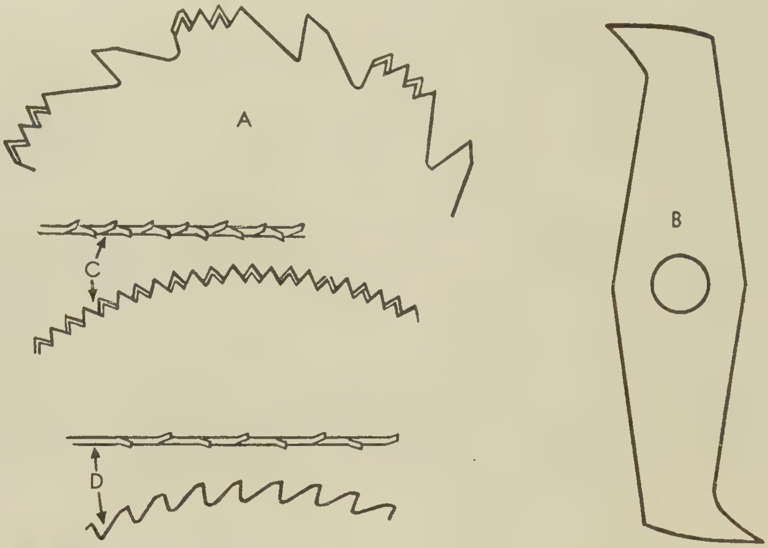
Care of the saw when not in use is a very important factor in preventing rust and damage to the teeth. The saws should always be kept in a hanging position. A good method is to drive a 2in. to 3in. nail into a board fixed on the wall of the workshop. Put in a nail for each saw. To keep the saws away from the wood place three small tacks around each nail about 2in. from the centre and projecting from the board about ¼in. These keep the saws away from the wood and assist in preventing rust.

Saws not in continuous use should always be coated with grease. It is impossible to keep a good sharp edge on the teeth once rust has attacked this part of the saw.

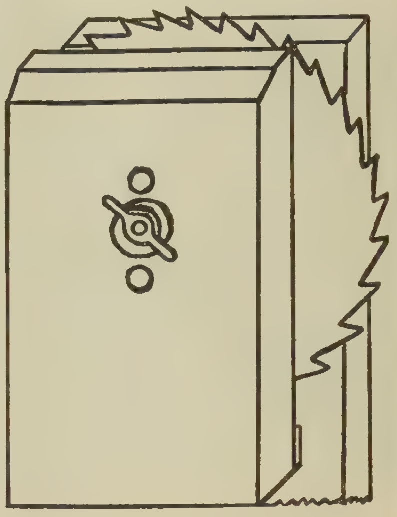
Types of Saws

Crosscut saw: This is intended for cutting across the grain and is not satisfactory for ripping. The teeth are generally V shaped and are sharpened so that the tip of the tooth comes to a sharp point.

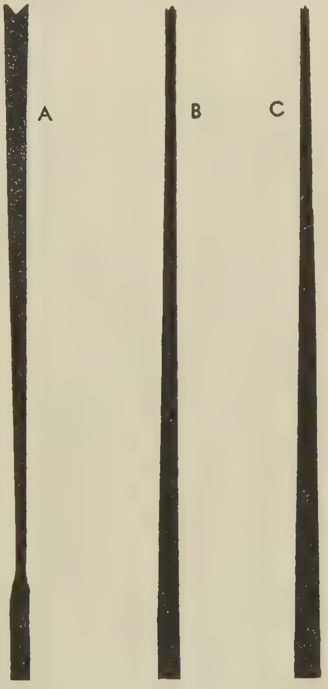
Rip saw: This is used for cutting with the grain of the wood. The points of the teeth are filed square across to give a chisel point.



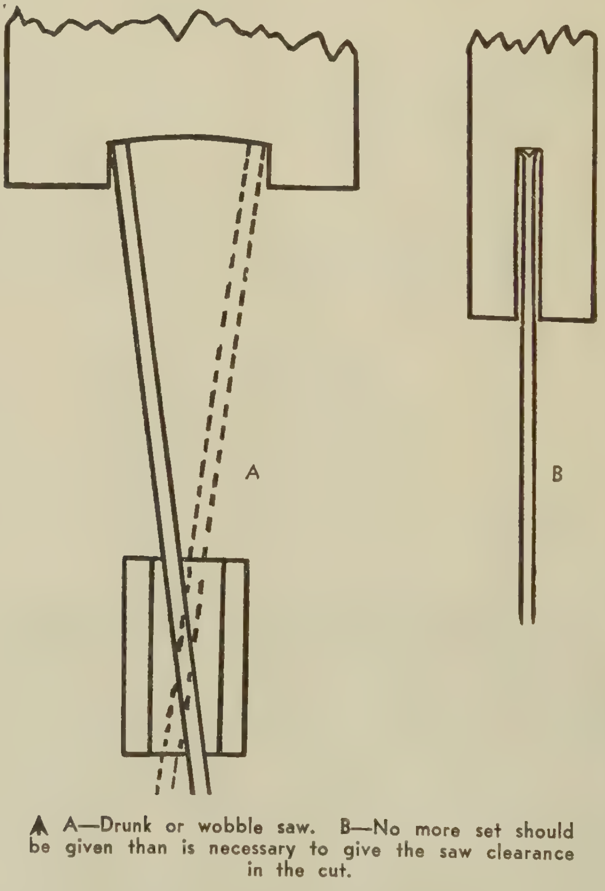
▲ A—Dado saw. B—Chipper blade. C—Crosscut teeth. D—Rip teeth.



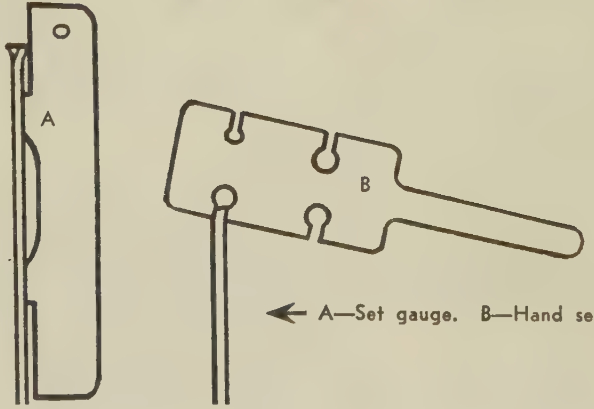
A sharpening clamp.



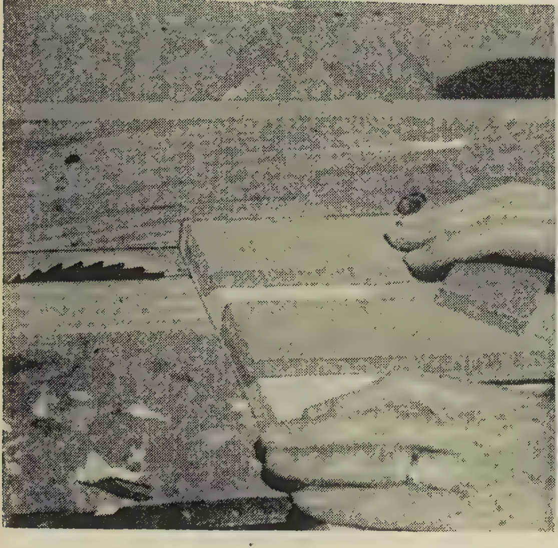
← A—Hollow ground saw. B—Swage saw. C—Taper splitting saw.



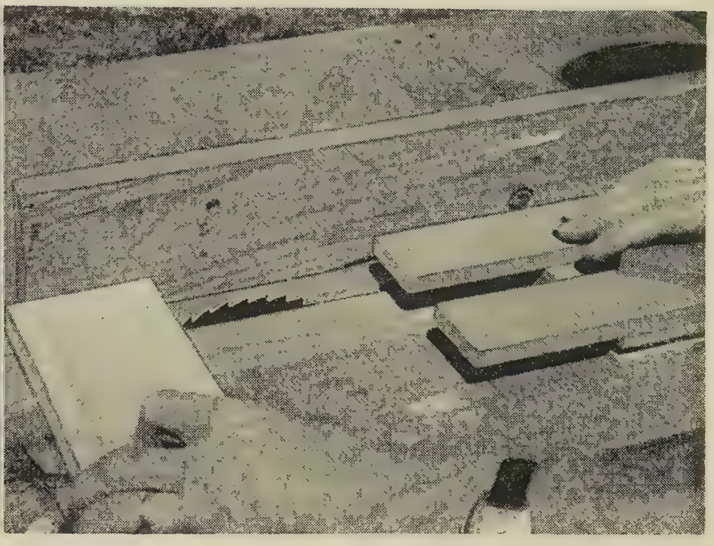
▲ A—Drunk or wobble saw. B—No more set should be given than is necessary to give the saw clearance in the cut.



← A—Set gauge. B—Hand setter.

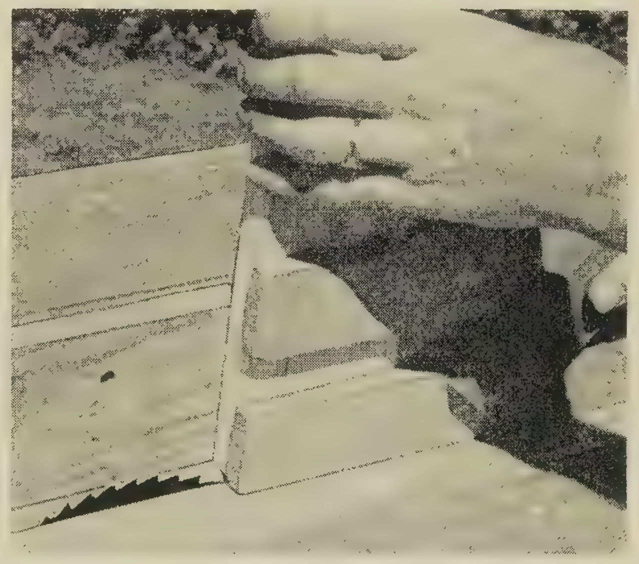


Recessing the ends of top bars. First cut: The jig holds the top bars down firmly and is then used to push the bars over the saw. The left hand only steadies the bars. The holding bars of the jig are made of 12in. x 1½in. x ½in. timber and the lower, pushing board of 8in. x 6in. x 13/16in. timber.



First cut completed: The jig only is withdrawn. The bars are then picked up and reversed with the left hand for the other ends to be cut.

▼ Second cut: The same jig is used in the same sequence as for the first cut, but is held on its side against the fence.



Combination saw: This saw has a combination of both crosscut and rip teeth and is suitable for doing odd jobs on the saw bench. However, it is recommended that when a run of ripping or crosscutting is to be done the appropriate saw should be used.

Hollow-ground saw: A hollow-ground saw blade is used where a fine, smooth finish is desired. This blade requires no set, as it is tapered slightly from the edge to the centre to provide the necessary clearance. A rip saw of this type is recommended for frame making to give the smooth finish so desirable.

Controlled cut or Grupp saw: This differs from the conventional blade in that it has only eight teeth and the cutting tip projects only .02in. above the rim of the saw. The saw produces chips rather than sawdust. It is sometimes called a safety saw because kick-backs are reduced to a minimum. Though these saws have been on the market for many years, they have not become popular.

Dado cutters: A dado saw is a device for cutting grooves out of timber. A complete set consists of two solid outside saws and a number of chipper blades of varying thickness, 1/16in. to ⅛in. or even thicker. The diameter of a set suitable for a beekeeper would be about 6in. with blades giving a total thickness of ⅞in. or 1in. By changing the number of chipper blades varying sized grooves can be cut.

Drunken saws are sometimes called wobble saws because they are set on the saw spindle at an angle. When in motion the saw wobbles, the extent of movement depending on the degree of angle. A saw of this type should be of heavy gauge (⅛in.) and should have proper metal collars for varying the amount of angle or cut. The base of a cut made with a drunken saw is never perfectly flat unless the blade is specially prepared for this one width of cut. With this type of saw, especially with a wide cut, extra care should be taken in firmly holding the timber on to the saw; otherwise it is liable to be torn out of the operator's hands because of the wobble.

Swage saw: This is a special saw very thin at the teeth and thicker than usual at the collar. It is thinned or tapered on one side only, the other side being flat. This saw is used for slicing off narrow strips and when a saving of timber is necessary. In working position the bevel face of the saw faces the fence.

Taper or splitting saw: This is much the same as the swage saw, except that it is tapered on both sides. It is used mainly for splitting narrow wood up the centre.

Keeping Saws in Working Condition

The quality and speed of the work turned out on a saw bench will depend on the condition of the saw blade. A dull saw is dangerous because it requires additional pressure on the wood and tends to tear the material instead of cutting it.

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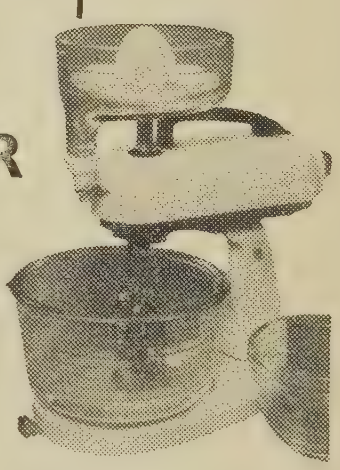

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Jointing: The first procedure in sharpening a saw is jointing or making the saw perfectly round. Before this is done the saw should be placed on the spindle and a mark or dab of paint placed on both the saw blade and the inside collar so that the saw will always be replaced in this same position on the spindle. Larger saw benches generally have a pin which serves the same purpose. The jointing is carried out by holding an abrasive stone in contact with the revolving blade. The safest way of doing this is to lower the saw until it is below bench level. Now bring it up very slowly until it just touches the stone. Stop, examine the saw, and see if all the teeth have been touched. If not, repeat the process. Now remove the blade and place it in the sharpening jig. The correct set on the teeth is essential for a good cutting saw. Setting and jointing of the saw should not be necessary each time it is sharpened.

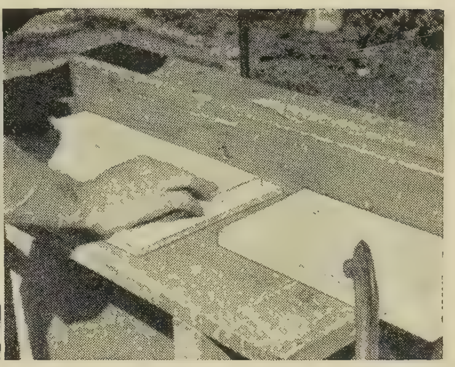
Setting is bending the tips of the teeth alternately right and left. This can readily be done with a hand saw set. To make sure each tooth is set an equal amount it is wise to use a set gauge. No more set than is necessary to give a clear cut should be used. A rule to remember is that the maximum amount of set should never be more than a quarter of the thickness of the blade at the tooth; for example, a blade ⅛in. thick should never have a set of more than 1/32in. Never bend the teeth over more than a third of the length of the tooth.

Sharpening: Place the saw in a suitable clamp at a good working height. See that the teeth are just above the top of the clamp; otherwise the saw will vibrate and make it impossible to get a good edge on the teeth. Suitable files will be required, a 6in. or 7in. slim taper, 3-corner file for the crosscut saw and an 8in. mill file with round edge for the rip blade.

In sharpening crosscut teeth file them as nearly as possible the same as when the saw was new. The file, which cuts only on the forward stroke, must be held at an angle with the blade, both vertically and horizontally, so that the teeth will be shaped as shown in the drawing at upper left on page 144. The teeth with set away from the operator are the ones to file. When these are done the saw is reversed and the remaining teeth filed. Care should be taken that no unevenness is left in the base of the gullet, as this is liable to collect sawdust and cause heating of the saw.

In sharpening a rip saw use the mill file with the rounded edge in the gullet and file square across the front of the tooth, with the file at right angles to the blade. The file should be slightly tilted to give the tooth a small amount of hook. After this stroke the same file is run over the top of the tooth until the jointing marks are removed. The saw is again reversed to complete the other set of teeth. Though the correct sharpening of the teeth is important, it is also necessary to keep the gullet to its original depth to allow the removal of sawdust. The base of the gullet should be left smooth and round.

A heavy G cramp is used to hold the stop when hand grips are being cut. The board is put tight to the fence and against the stop and is then lowered on to the saw.



The board is now pushed along to give length to the grip. It is then slid back to the stop and picked up with the left hand.

The combination saw is sharpened by following the instructions given for both the crosscut and rip saws. In this saw the rip or raker teeth are filed slightly below the points of the crosscut teeth.

Dado cutters should be jointed with all the chipper blades included and filed by practically the same method as for an ordinary blade. The mill file should be run flat over the top of the chipper blades until the jointing mark is removed, care being taken that sufficient clearance is given to the back of the tooth.

It is recommended that periodically all saws should be sent to a local saw sharpener for reshaping of teeth and gulleting.

USES OF FENCES AND JIGS

At no time should timber be cut without the use of a fence.

The short fence is used for normal ripping purposes. The front edge of this fence should not go beyond the gullet of the saw. This gives an easy flow of timber past the saw and greatly reduces the possibility of throwback. The cutting is also more accurate.

The long fence extends past the back of the saw and is used when grooving or rabbeting, when part of the timber is always hard against the fence. This fence must be in perfect alignment with the saw. Never attempt to rip timber with this type of fence.

Crosscutting

Square the crosscutting fence at right angles to the saw. Now trim the end of a wide board and with a carpenter's square check the cut. Make sure the square fits the edge of the wood resting against the fence.

When the long boards for supers or frames are being cut, care should be taken to select the timber for the appropriate part, making sure not to cut knots on ends which will require further resawing or nailing.

A stick marked with the lengths of the various hive components is very useful for quickly marking out a length of timber in the various sizes to avoid knots near the saw cut and to eliminate waste.

Should any of the timber have a curved edge, care should be taken in how it is sawn. The rounded or convex edge should always be up to the crosscutting fence to avoid jamming of the saw (see drawing). Accurate right-angle cuts cannot be secured this way, so it is best to cut badly curved timber into slightly longer lengths and then to recut both ends again, with the hollow side this time to the fence.

The riving knife, made of quality steel, and guard should be used, care being taken that the riving knife is never more than ½in. from the back of the saw and in correct alignment. The floor around the bench should be kept clear of small blocks of wood.

Ripping

Always use a push stick when operating the ripping saw. Fix the saw to the required height above the bench top. Allow one-third extra to the thickness of the timber being ripped. If too much saw is showing, it will give a rough cut with tear on the underside of the board. If the saw is too low, it will clog and heat up. A hot saw will wander and soon spoil. When ripping off strips, such as top bars, cut off four, keeping them in the same position as they came off the board, place them together, and measure them back and front. If the two measurements are the same, no adjustments are necessary. However, if there is a slight difference, pack out the fence to correspond with the greater measurement.

Make sure the riving knife and guard are used.

Grooving

When using the dado cutters for grooving or cutting out hand grips make sure the chipper blades are spaced evenly around the spindle. This gives an even cut. A throat plate with the minimum cut out should always be used. If the cutters become clogged up, it is best to dismantle the set and clean it. It is not desirable to have any more chipper blades in the set than are actually required.

The chipper blades are always enclosed between the two saws.

Testing for Crack in Saw Blade

A saw should be in sound condition to do its job correctly and give the operator an assurance of safety. A cracked saw should never be used, and to detect even the smallest of fractures the following method can be used. Clean the saw and dip it in kerosene for a short period, say 5 minutes. Clean off all the kerosene with a rag and dust the blade with powdered chalk. After a little while the crack will show up because of retained kerosene soaking into the chalk. It is not worth while trying to repair the saw, as small saws are not very costly to replace. **The main thing is to replace a damaged saw immediately. Do not wait until it flies to pieces.**

CARE OF TIMBER

Timber sawn from the log should be correctly stacked as soon as possible, particularly *Pinus radiata*, which will deteriorate very quickly if left unstacked, even for a very short period, after it has been sawn. The beekeeper who is securing his timber directly from the sawmill should make arrangements for delivery as soon as possible after sawing. He should also try to get his 10in. boards sawn a full inch thick if possible. This will allow the boards, when dry, to be dressed down to ⅞in. Otherwise he will find the timber measuring 13/16in.

Method of Drying

Freshly sawn timber should be stacked to get rid of most of the sap moisture as quickly as possible. The usual method of doing this is to stack the timber in the form of a tent, or an inverted V, with the boards resting edgewise on the supporting frame, thus preventing sagging. Timber stacked this way has plenty of air moving through it all the time. Rain and frost will also help to hasten the removal of sap moisture. To prevent deterioration of the timber where the boards would meet at the top short 1in. fillets are placed between each board. These can be kept in place by lightly nailing them to the beam or ridge of the frame.

The next stage is to get the boards dry enough for use. This is done by horizontal stacking. A suitable foundation has first to be prepared to take the weight of the timber. Short lengths of 4in. x 3in. timber are spaced about 3ft. apart. To give the timber a slope of about 1ft. in 12ft. the blocks are built up at one end to 1ft. and the intermediate blocks lined up accordingly.

The boards can now be placed in position. If the stack is to be two or three boards wide, leave an inch space between each board. Now place wooden 1in. x 1in. fillets directly above the 4in. x 3in. sleepers and across the first layer of boards. Carry on until the stack is completed, making sure each fillet comes directly above the sleepers. The completed stack can be covered on the top with a few sheets of iron, and grass should be kept down from around the sleepers.

Timber carefully stacked in this way will come out in good, straight boards and ready for the planer. The time taken to dry timber thoroughly will depend largely on general weather conditions, but if possible, at least 12 months should be allowed.

CALCULATION OF SPEEDS AND PULLEY SIZES

Anyone working with machinery should know how to calculate pulley sizes and shaft speeds. Four factors govern the speed of a honey pump, extractor, or saw. These are speed of motor, size of pulley on motor shaft, speed of machine to be driven, and size of pulley on machine.

In any machine set-up at least two of these items are usually known. The speed of the electric motor is always shown on the plate fastened to the motor, and usually known also is the speed at which the particular machine has to run. There are several methods of calculating the unknown factors. A simple method is as follows:—

Speed of motor × diameter of pulley on motor should = speed of driven machine × diameter of pulley on driven shaft.

If the driven machine (for example, an extractor) is to run at a slower speed than the motor, the pulley on the motor will be smaller than that on the driven machine. As the smallest V pulley is about 2in. to 2½in. in diameter, the size of the larger pulley is worked out thus:—

Speed of motor (1450 r.p.m.) × size of pulley on motor (say 2in.) = 2900.

Speed of extractor (200 r.p.m.) × size of pulley (?) 2900 ÷ 200 = 14½in.

Because with a saw the speed required is greater than that of the motor, the smaller pulley goes on the saw spindle.

Speed of motor (1450 r.p.m.) × diameter of pulley on motor (?) =

Speed of saw spindle (2500 r.p.m.) × diameter of pulley on shaft (2½in.) =

6250 ÷ 1450 = approximately 4⅓in. pulley.

For practical purposes the diameter of the V pulley, as sold, is measured from the outside edge.

V belts and pulleys are sold in two sizes, called A or B section. The A section belt measures ½in. across the top, and the B section measures ⅝in., with pulleys corresponding.

The standard used by British manufacturers for designating the thickness or gauge of the saw is the B.W.G. (Birmingham Wire Gauge). For ripping timber into small pieces, such as top bars for bee frames, a very thin saw is desirable to reduce the amount of waste. Sometimes use of such a saw enables an extra bar to be cut from a piece of timber.

The following table gives the measurements of a gauge range that is likely to be encountered:—

Gauge number (B.W.G.)	Thickness in inches	
21	.032	approx. 1/32in.
20	.035	
19	.042	
18	.049	
17	.058	
16	.065	approx. 1/16in.
15	.072	
14	.083	
13	.095	
12	.109	
11	.120	approx. ⅛in.
10	.134	
9	.148	
8	.165	

Electrical Power Unit

A thousand watts used for 1 hour equals 1 unit. As this is the basis of payment for electricity supply, it will be of interest to know just what power is being used by the various machines.

	Units used per hour
1000-watt heating element	1
¼ h.p. motor	.185
⅓ h.p. motor	.24
½ h.p. motor	.37
1 h.p. motor	.74

Always remember: Don't get too familiar with the saw, and keep your mind on the job and your fingers on your hand.

"Safety Hints for Operators of Circular Saws" is a pamphlet published by the Department of Labour and the Department of Health, and is available on application, free of charge.

Lambing Estimates for 1957 Season

The estimated number of lambs born in the 1957 season, nearly 28,050,000, is the highest on record and an increase of more than 2,660,000 on the previous season's number. The estimated total of breeding ewes, 28,920,845, is also the highest recorded. The lambing percentage of 96.98 is not far short of the record percentage of 97.27 in 1953 and is 2.7 per cent. higher than in 1956.

The lambing percentage for the North Island is 90.86, a slightly better result than last year's. The South Island percentage, 104.03, is 3.66 per cent. better than in 1956. The Canterbury Land District percentage of 103.82 is a substantial improvement on last season's 98.93. A record figure of 111.26 per cent. is achieved in the Southland Land District.

Totals for counties, districts, and the Dominion are set out in the following tables, which have been contributed by the Animal Industry Division of the Department of Agriculture.

NORTH AUCKLAND LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Mangonui	48,900	82.26	40,225
Whangaroa	16,451	82.51	13,574
Hokianga	47,400	81.54	38,650
Bay of Islands	107,800	86.49	93,236
Whangarei	119,400	87.20	104,117
Hobson	128,200	87.11	111,675
Otamatea	126,647	89.18	112,944
Rodney	158,800	85.26	135,393
Waitemata	120,300	86.37	103,903
Great Barrier Island	5,200	60.05	3,123
Manukau	98,000	85.08	83,378
Franklin	206,200	87.10	179,600
Totals	1,183,298	86.18	1,019,818

SOUTH AUCKLAND LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Raglan	612,600	88.03	539,272
Waikato	272,000	91.62	249,206
Waipa	248,100	96.08	238,374
Otorohanga	268,075	92.39	247,674
Waitomo	520,482	85.92	447,198
Taumarunui	422,400	92.89	392,367
Coromandel	39,579	84.61	33,488
Thames	16,080	86.57	13,920
Hauraki Plains	32,900	87.47	28,778
Ohinemuri	47,458	90.68	43,035
Piako	159,500	96.38	153,726
Matamata	420,300	97.98	411,810
Tauranga	215,900	92.73	200,204
Rotorua	276,200	91.75	253,414
Taupo	121,600	90.93	110,571
Whakatane	89,700	92.18	82,685
Totals	3,762,874	91.57	3,445,722

TARANAKI LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Clifton	112,200	83.08	93,216
Taranaki	40,500	95.62	38,726
Inglewood	79,400	94.11	74,723
Egmont	40,500	98.61	39,937
Stratford	220,500	90.03	198,516
Eltham	71,474	91.54	65,427
Waimate West	10,749	104.88	11,274
Hawera	97,700	94.37	92,199
Totals	673,0[illegible]	91.23	614,018

HAWKE'S BAY LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Wairoa	428,800	79.29	339,996
Hawke's Bay	1,127,600	91.25	1,028,935
Waipawa	518,200	98.79	511,930
Waipukurau	176,500	88.80	156,732
Patangata	607,000	86.19	523,173
Dannevirke	467,000	100.42	468,961
Woodville	117,800	102.37	120,592
Totals	3,442,900	91.50	3,150,319

GISBORNE LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Opotiki	60,600	79.85	48,389
Matakaoa	59,500	81.07	48,237
Waiapu	247,235	75.64	187,009
Uawa	111,133	77.74	86,395
Waikohu	374,327	88.60	331,654
Cook	468,158	79.26	371,062
Totals	1,320,953	81.21	1,072,746

WELLINGTON LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Patea	260,063	90.99	236,631
Waimarino	207,500	91.78	190,444
Waitotara	171,650	89.30	153,283
Wanganui	321,601	84.13	270,563
Rangitikei	1,078,600	94.74	1,021,866
Kiwitea	319,700	100.20	320,339
Pohangina	165,100	96.96	160,081
Oroua	288,525	103.33	298,133
Manawatu	174,335	99.76	173,917
Kairanga	130,023	98.32	127,839
Horowhenua	139,641	90.80	126,794
Hutt	75,149	88.13	66,229
Makara	52,664	77.51	40,820
Pahiatua	195,500	96.43	188,521
Akitio	168,400	86.99	146,491
Castlepoint	104,900	85.58	89,773
Eketahuna	162,700	90.97	148,008
Mauriceville	58,800	92.44	54,355
Masterton	355,800	92.33	328,510
Wairarapa South	228,400	93.73	214,079
Featherston	375,000	95.93	359,738
Chatham Islands	68,300	75.00	51,225
Totals	5,102,351	93.44	4,767,639

MARLBOROUGH LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Sounds	80,600	70.6	56,904
Marlborough	309,400	93.2	288,361
Awatere	201,800	93.3	188,279
Kaikoura	139,869	97.1	135,813
Totals	731,669	91.48	669,357

NELSON LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Waimea	206,000	92.1	189,726
Golden Bay	46,400	89.0	41,296
Buller	2,853	87.7	2,502
Murchison	36,980	87.7	32,431
Inangahua	26,610	106.3	28,286
Totals	318,843	92.28	294,241

WESTLAND LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Grey	40,768	104.6	42,643
Westland	50,330	104.8	52,746
Totals	91,098	104.71	95,389

CANTERBURY LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Amuri	273,800	84.5	231,361
Cheviot	180,100	98.3	177,038
Waipara	372,469	119.0	443,238
Kowai	119,391	121.4	144,940
Ashley	80,400	99.9	80,320
Rangiora	72,046	110.0	79,251
Eyre	87,034	105.2	91,560
Oxford	118,343	102.4	121,183
Tawera	52,225	91.0	47,525
Malvern	232,477	106.1	246,658
Paparua	70,970	104.8	74,377
Waimairi	3,198	113.1	3,617
Heathcote	8,628	97.1	8,378
Halswell	21,267	108.7	23,117
Mount Herbert	39,078	102.8	40,172
Akaroa	89,525	108.0	96,687
Wairewa	71,113	102.2	72,677
Springs	52,320	106.3	55,616
Ellesmere	123,752	114.8	142,067
Selwyn	199,330	95.6	190,559
Ashburton	1,242,000	107.3	1,332,666
Geraldine	368,600	100.0	368,600
Levels	290,193	111.6	323,855
Mackenzie	337,600	90.5	305,528
Waimate	674,680	100.4	677,379
Totals	5,180,539	103.82	5,378,369

OTAGO LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Waitaki	609,400	102.3	623,416
Waihemo	136,675	107.0	146,242
Waikouaiti	94,600	93.5	88,451
Peninsula	24,551	108.5	26,638
Taieri	218,027	94.5	206,036
Bruce	345,809	104.0	359,641
Clutha	705,961	106.0	748,319
Tuapeka	478,400	98.0	468,832
Maniototo	288.580	90.0	259,722
Vincent	305,594	98.5	301.010
Lake	154,300	89.0	137,327
Totals	3,361,897	100.11	3,365,634

SOUTHLAND LAND DISTRICT

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
Southland	2,841,500	114.1	3,242,152
Wallace	882,900	103.3	912,036
Stewart Island	27,000	72.0	19,440
Totals	3,751,400	111.26	4,173,628

DISTRICT ESTIMATES

County	Breeding ewes (as at 1957)	Estimated percentage of lambs	Estimated number of lambs
North Auckland	1,183,298	86.18	1,019,818
South Auckland	3,762,874	91.57	3,445,722
Gisborne	1,320,953	81.21	1,072,746
Hawke's Bay	3,442,900	91.50	3,150,319
Taranaki	673,023	91.23	614,018
Wellington	5,102,351	93.44	4,767,639
Marlborough	731,669	91.48	669,357
Nelson	318,843	92.28	294,241
Westland	91,098	104.71	95,389
Canterbury	5,180,539	103,82	5,378,369
Otago	3,361,897	100.11	3,365,634
Southland	3,751,400	111.26	4,173,628
Totals	28,920,845	96.98	28,046,880

Dominion Totals

The following table shows the estimated lambing for the North and South Islands and the Dominion for 1957 and the previous 5 years together with the actual number of lambs tailed.

Year	Number of breeding ewes	Estimated percentage of lambs	Estimated number of lambs	Number of lambs tailed
NORTH ISLAND				
1957	15,485,399	90.86	14,070,262	—
1956	14,611,500	89.16	13,026,961	—
1955	14,103,936	87.38	12,323,682	—
1954	13,529,687	89.63	12,126,101	12,444,533
1953	13,097,679	96.24	12,605,517	12,836,745
1952	12,717,819	93.10	11,839,659	12,007,684
SOUTH ISLAND				
1957	13,435,446	104.03	13,976,618	—
1956	12,311,700	100.37	12,356,739	—
1955	12,082,422	103.46	12,500,215	—
1954	11,320,843	103.01	11,662,121	11,794,656
1953	10,683,697	98.52	10,526,302	10,758,060
1952	10,245,527	96.78	9,916,102	10,154,586
DOMINION				
1957	28,920,845	96.98	28,046,880	—
1956	26,923,200	94.28	25,383,700	—
1955	26,186,358	94.80	24,823,897	—
1954	24,850,530	95.73	23,788,222	24,239,189
1953	23,781,376	97.27	23,131,819	23,594,805
1952	22,963,346	94.74	21,755,761	22,162,270

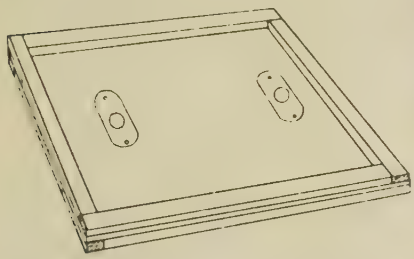
Taking off Supers during Honey Flow

Seasonal Notes for the Domestic Beekeeper

DURING a heavy honey flow beekeepers may wish to take off supers of honey before the season is finished. In this article A. W. Bennett, Apiary Instructor, Department of Agriculture, Hamilton, describes the methods to use when removing supers of honey from a hive while the flow is still on and at the close of the season.

THE clearer or escape board for clearing bees from supers which are to be taken off is made by nailing strips of wood ⅞in. wide x ⅜in. thick round both sides of a sheet of plywood or hardboard. In this board is fitted an escape (Porter pattern) which allows the bees to pass from the super but not return into it.

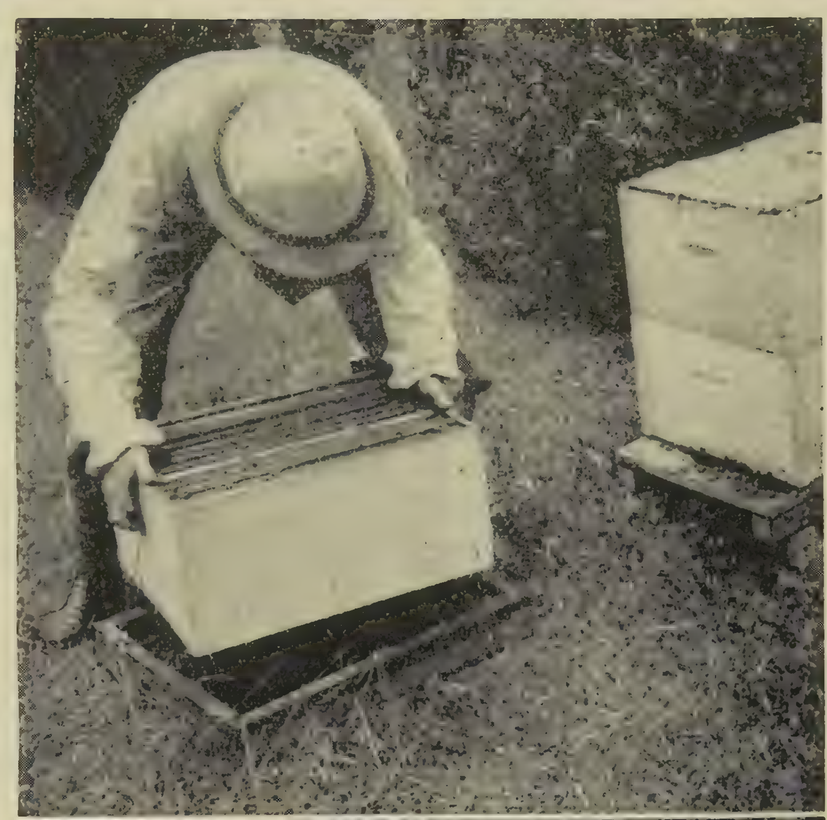
Two bee escapes are sometimes used as illustrated below to ensure that should one escape be blocked by a dead bee or a drone or a piece of burr comb from the bottom of a frame, the bees can still go down through the other escape.



Using the Clearer Board

The clearer board should be placed on the hive the day before the honey is to be extracted. This will give ample time for the bees to go down and the super to be taken off the hive free of bees, provided bees cannot gain admittance to the super under the roof or over the edge of a badly fitting super.

If frames of honey in the super to be taken off are completely sealed over by the bees, it will not be necessary to lift this heavy super from the hive to place the clearer board in position. This can be done by lifting



UPPER—Super about to be → bumped after bees have been driven down by smoke. Note that the super is lifted only about 3in.

LOWER—Bees in the hive roof after the super has been bumped.

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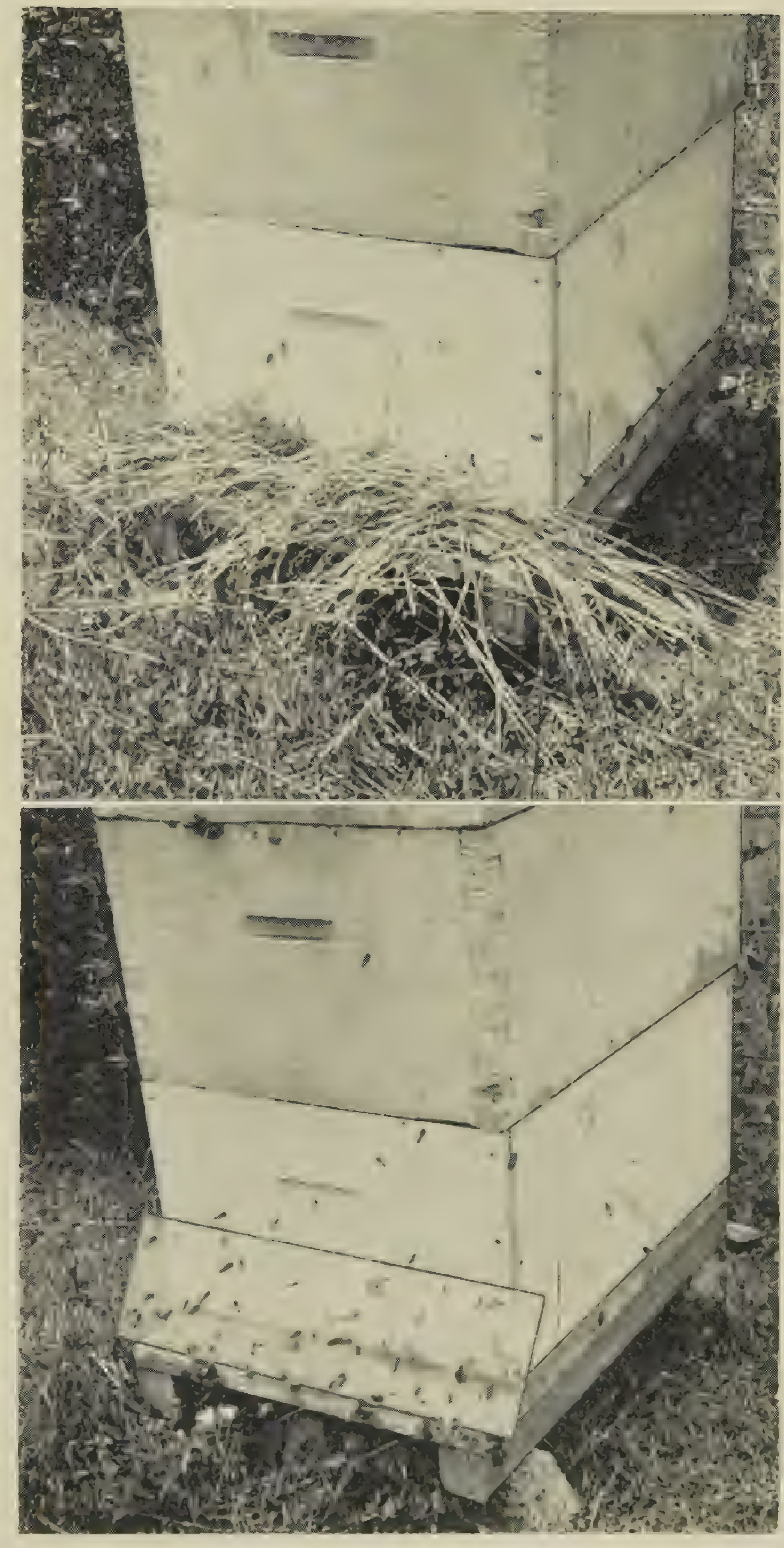
one end of the super by the hand grip with the left hand and sliding the clearer board in with the right hand as far as possible, lowering the super down, and then with both hands sliding the clearer board and the super into position.

Where there is unripe or unsealed honey, however, this should be exchanged for sealed combs from the super under it. If this has to be done, the top super will have to be lifted from the hive for the necessary adjustments to be made. The clearer board should then be placed in position and the full super of capped combs and bees placed on top. If there is only one super of surplus honey on the hive, it will be advisable to wait until most of the honey is sealed before taking it off, as too much unsealed honey will cause honey to ferment after extracting.

Domestic beekeepers will be well advised to use only the clearer board method for removing honey from a hive. They will then be sure, if the board is used correctly and the hive parts are reasonably sound, that the minimum of robbing will occur and that the extracting room will be free of bees.

Removing Honey by Use of Smoker

If honey is to be removed by the use of a smoker, this should be well cleaned and filled with fresh fuel so that sparks or ash will not be blown on the honey. The smoker should be well alight and giving off a good volume of clean white smoke. Then the roof of the hive can be very gently removed and the clean smoke blown over the tops of the frames.



METHODS OF CHECKING → ROBBING OF HIVES

UPPER—Grass piled over the entrance.

LOWER—Sheet of glass placed against entrance.

As the bees disappear off the top bars the smoker should be directed further down between the combs and smoke gently blown between them, the operator making sure to spread the smoke evenly between all the frames in the box. In this way the bees will be driven down to the bottom bar, from which most of them can be dislodged by simply lifting one end of the box and brushing them off with a fine brush or strong feather or by giving the box a sharp bump or two on the bottom, this being done on the rim of the up-turned roof, which for this method would have been put handy to the hive.

This system is not nearly as efficient as the clearer board method, as the super will not be completely free of bees, which will be a nuisance in the extracting room. Also, if the procedure is used at the end of the season, honey which is shaken from the combs when the box is bumped will quickly cause robbing. However, the system does have the advantage that should the beekeeper want to extract the honey immediately, he can go to the hive and remove a box from it very quickly.

Robbing

Robbing is liable to be caused by the exposure of stores or honey, whether in the honey house or on the hive through badly fitting boxes and lids, honey spilt on the ground when supers are being taken off, or weak hives not being strong enough to guard against robbing bees. Once bees have obtained easy stores by robbing from any source, particularly in late summer and autumn, they are very reluctant to forage for nectar again unless it is abundant, but will endeavour to obtain stores easily, even by attacking other hives.

Some robbing will occur in the best managed apiary, but if precautions are taken, it should not develop seriously. All possible care should be taken by the beekeeper not to expose honey to the bees, and entrances of weak hives should be reduced.

When robbers are about the guard bees will be very active, challenging all the bees that try to enter, and fighting will be seen at the hive entrance. The robbing bees will hover round the entrance and then try to dart past the guards. The beekeeper should watch for these signs and also the flight of the bee, remembering that a bee loaded with nectar or honey will always have its hind legs bent forward, thus indicating whether the load is going into the hive or the hive is being robbed.

How to Deal with Robbing

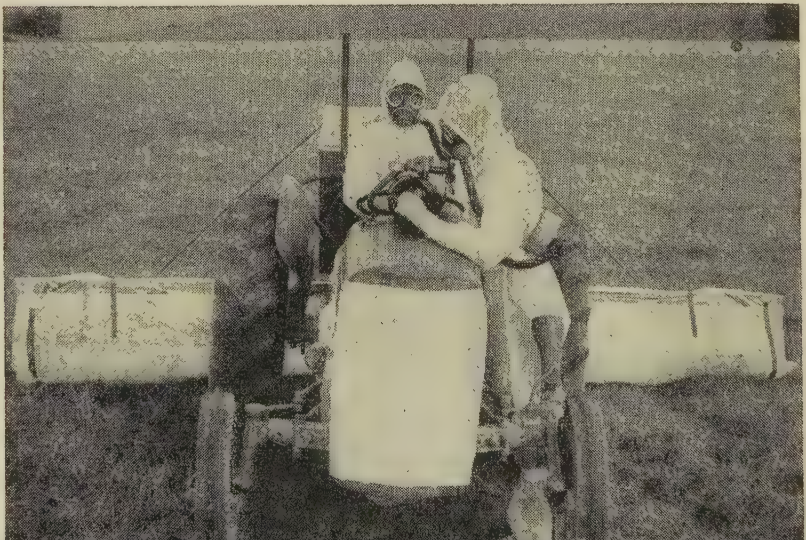
Action should be taken at the first sign of robbing. One of the easiest ways of dealing with a mild case is by cutting a piece of glass about 6in. wide and about 4in. longer than the entrance and placing this at an angle over the front of the hive, leaving openings only at the ends. The bees entering the hive will be greatly confused by this piece of glass, thus giving the guard bees much more time to detect the robbers. Alternatively the entrance should be reduced and grass piled loosely over the entrance. Bees will have to scramble through the grass to gain entry.

One way to stop a bad case of robbing is by the exchange method. Where one hive is robbing another simply change the position of the hives. This method can be used only if the two hives are in the same apiary.

In all cases of robbing the entrances should be reduced to about half the usual size.

Robbing is one of the main ways by which disease is spread, so every effort should be taken to avoid it. If it starts, immediate action should be taken to stop it.

Radioactivity Tests on British Farm



EXPERIMENTS to find out how soon it would be safe to eat produce from fields contaminated by fall-out from nuclear test explosions are being made at the British Agricultural Research Council Field Station at Compton, near Newbury, Berkshire. In the illustration above workers wearing protective clothing are checking the air sampling equipment, which indicates the amount of radioactive dust in the area. The field has been sprayed with Strontium-89.

At the Station the scientists are also testing if special methods of cultivation could bring the affected fields into use more quickly and how much of the radioactive dust from bomb tests is going out of the soil into crops.

Sheep Dog Trials

NORTH ISLAND Sheep Dog Trial Association centre championships will be held as follows:—

Northland (Molesworth Sheep Dog Trial Club), 14, 15, and 16 May; Waikato (Tauranga S.D.T.C.), 24, 25, and 26 February; Main Trunk (Aria Collie Club), 20, 21, and 22 March; Taranaki (Egmont S.D.T.C.), 11 and 12 April; Wanganui (Ruahine-Rangiwahia C.C.), 28, 29, and 30 April; Wairarapa and Southern Hawke's Bay (Masterton C.C.), 29 and 30 April and 1 and 2 May; Hawke's Bay (Taradale S.D.T.C.), 21, 22, and 23 April; Poverty Bay (Opotiki S.D.T.C.), 30 April and 1 and 2 May.

The North Island championships will be conducted by the Waikato Centre at Rotorua and will begin on 26 May.

Centre championships in the South Island will be held as follows:—

Marlborough - Nelson (Wairau Valley), 13, 14, 15, and 16 May; Canterbury (Geraldine), 15, 16, 17, and 18 April; North Otago (Palmerston), 26, 27, and 28 May; Otago (Heriot), 14, 15, and 16 May; Southland (Greenvale), 1, 2, and 3 April.

The South Island and New Zealand championships will be conducted by the Canterbury Centre at Oxford and will begin on 9 June.

Main Wool Sales

The dates and venues of main wool sales from mid-February are:—

12 and 14 February: Christchurch.
19 and 21 February: Invercargill.
26 and 28 February: Dunedin.
5 March: Timaru.
14 March: Wanganui.
19 and 21 March: Auckland.
26 and 28 March: Napier.
2 April: Wellington.
21 April: Christchurch.
26 April: Invercargill.
30 April: Dunedin.
15 May: Wanganui.
19 May: Auckland.
24 May: Napier.
28 May: Wellington.

Pedigree Pig Improvement Scheme

ALL pig producers, but particularly pedigree breeders, should be keenly interested in any move to improve the efficiency of production within their industry. In this first review of the operations of the new performance-recording scheme for pedigree pigs by A. Longwill, Superintendent, Pig Industry, Department of Agriculture, Wellington, emphasis is placed on the need for strong support for the steps the industry is taking to put its breeding stock on a sound foundation.

AN outline of a pedigree pig improvement scheme started in 1956 was given in the July 1956 issue of the "Journal". The scheme, which has been in operation for 18 months, aims to give breeders an opportunity to check the efficiency of their management and at the same time provides a "coarse screen" for selection of profitable pigs.

Though the scheme has not been as nearly as well patronised by breeders as was envisaged by its sponsors, it is hoped that the publication of results to date will create renewed interest on the part of both those who are looking for a boar from a proven strain and those breeders who have not yet taken advantage of the scheme to prove their stock.

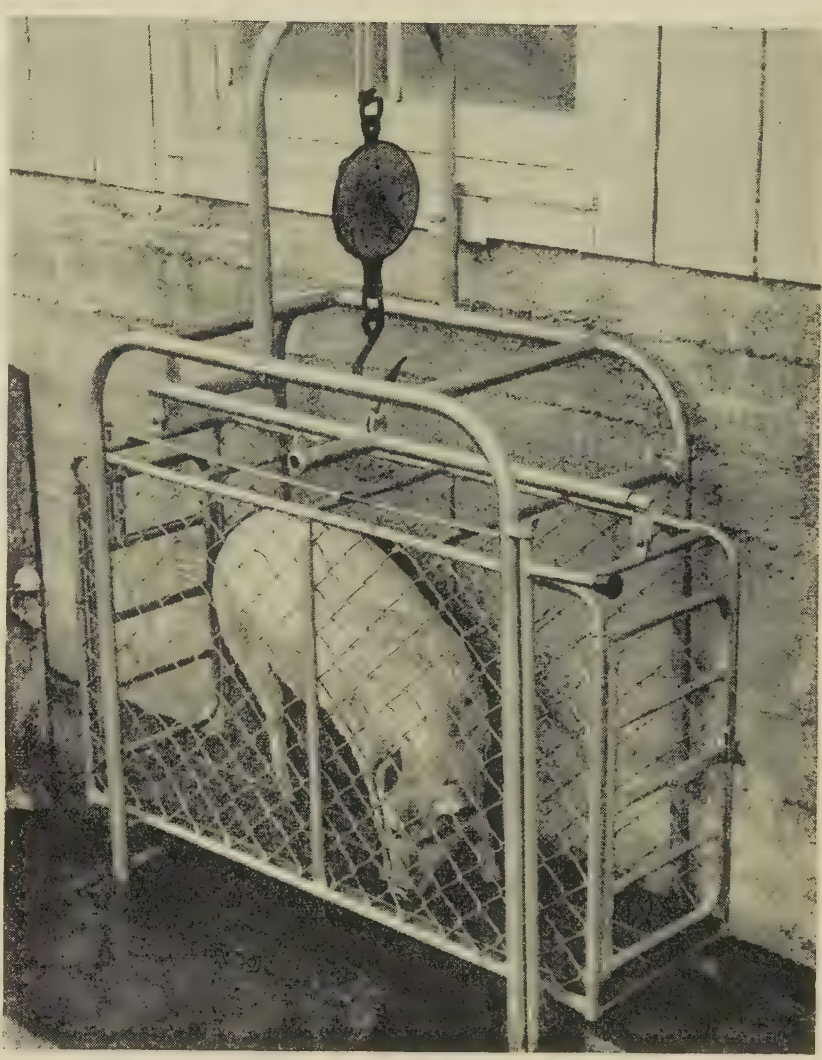
Place of Scheme in Pig Improvement

As was pointed out in the article published when the scheme was initiated this on-farm recording scheme is regarded as the first step in the whole concept of performance testing of purebred pigs which is essential to consistent selection of breeding stock on productive performance.

At a joint meeting of the New Zealand Pig Breeders' Association and New Zealand Pig Producers Council in Palmerston North on 19 September 1957 the future policy on pig improvement work in New Zealand was considered and it was resolved that the following cardinal points of policy should be laid down for the guidance of the Joint Pig Improvement Committee.

"There are three separate and indivisible requirements for pig improvement:—

1. A premium of the order of 5 per cent. of the value between the best quality carcass and the average and a similar differential between the average and lowest grade.
2. Identification of the best strains of stock, particularly by progeny testing of boars through testing station methods.
3. The publication of results of tests as early as possible after their completion so that maximum use may be made of them by the industry."



Convenient means of weighing pigs for litter recording and for checking fattening gains and finishing weight are desirable on any piggery.

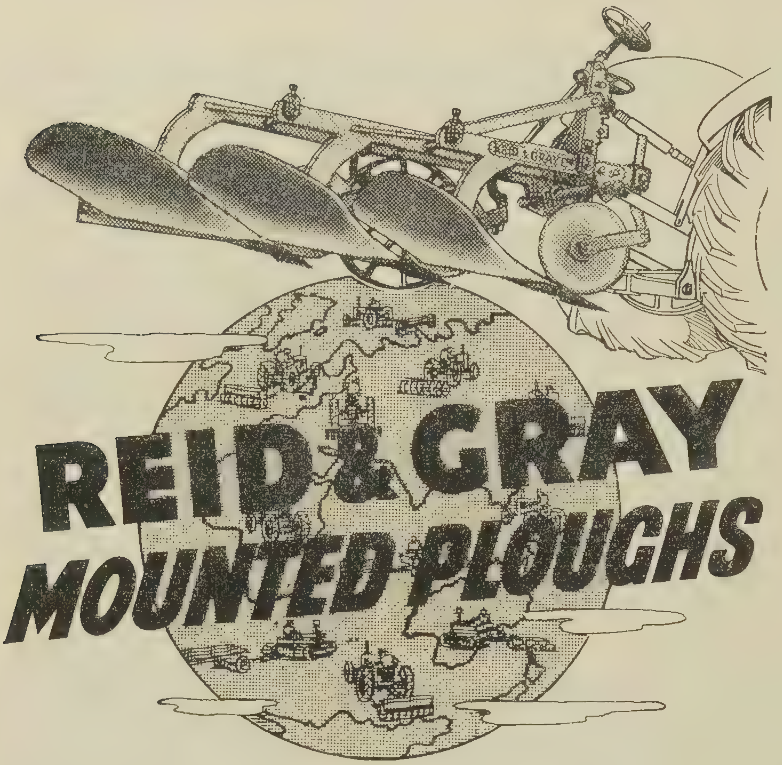
Detailed recommendations of aims which the industry might well set itself were also put forward and adopted for further study and to be reported on by the Joint Pig Improvement Committee. They were:—

1. The aim should be to have a testing station to test the progeny of 25 boars annually (100 litter groups) by 1960-61.

2. As a prerequisite to this the Pedigree Pig Improvement Scheme should be developed on the basis of boar progeny recording to cover the progeny of 50 boars each mated to 4 sows which must be not closer related than half-sisters.

3. A Pig Testing and Improvement Advisory Committee, including scientific and trade personnel as well as producers, should be set up to advise the industry bodies on the technique of pig improvement.

These recommendations have not yet been reported on by the joint committee, but every effort is being made to record the progeny of boars from sufficient litters so that the group of records gives some guide to the breeding worth of the boar concerned in each case. Though there are no boars from which sufficient litters have yet completed test to give an adequate guide to breeding worth, a small number of boars already have a sufficient proportion of qualified litters in those tested so far to indicate that they will in all probability achieve the classification "Merit Sire".



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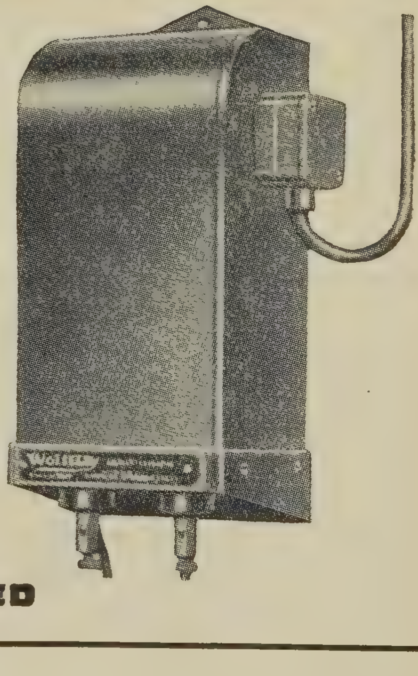

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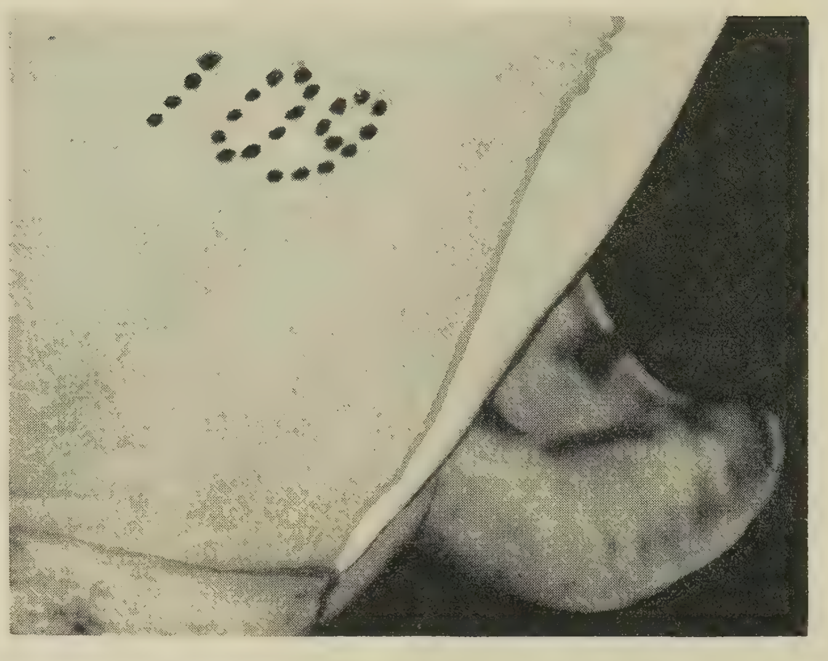

Test pigs are identified on the hooks by shoulder tattoo.

Preliminary Steps to Testing

Breeders who wish to remain in the forefront of the industry and be able to supply breeding stock capable of increasing the efficiency of production in the herds they are supplying must in their own interest make use of the scheme.

It is appreciated on all sides that testing station methods are essential to effective selection for characters of economic importance such as food-conversion efficiency and carcass quality. However, testing station facilities are costly and there must be restricted entry into the station from the outset. This means that progeny of boars which have proved themselves under the on-farm recording scheme will have preference over those from unrecorded stock.

Meantime, boars which have sired three or more Class A litters from sows not closer related than half-sisters, provided these litters are at least 50 per cent. of the total litters recorded by the boar, will be designated Merit Sires.

Analysis of Results to Date

The following analysis covers the first 150 litters nominated under the Pedigree Pig Improvement Scheme. The rules require nominations of litters for recording to reach the Secretary, New Zealand Pig Breeders' Association, P.O. Box 148, Palmerston North, at least a fortnight before the due date of farrowing.

If the breeder finds it necessary to cancel the nomination for any good reason, such as abortion, small litter farrowed, or losses to such an extent that the litter fails to reach "threshold" level on litter numbers and weight at 3 weeks, this can be done and the fee credited to a further recording, nomination for which must be made within 12 months of the original nomination date, provided particulars are given of the cancelled nomination, of the date of farrowing, and the number of pigs born and being reared at the date of cancellation.

For the first 150 litters the threshold litter performance standard has been:—

	3 weeks litter standards	
	No. of pigs	Litter weight lb.
Maiden litters	7	75
Second and subsequent litters	8	95

To attract more entries in the scheme this threshold has now been lowered to 6 pigs and 65lb. at 3 weeks for maiden litters and 7 pigs and 80lb. at 3 weeks for second and subsequent litters. However, in this analysis the original standards, as shown in the above table, are adhered to.

Cancellation of Nominations

Of 43 litters for which the nominations were withdrawn before the litter recording stage, 39 were below the threshold set for the number of pigs remaining in the litter. This represents 26 per cent. of total nominations and includes 16 litters in which the total number born was below the required standard (low prolificacy).

A further 13 litters farrowed sufficient pigs but suffered heavy losses at farrowing (6 litters), through overlying (5 litters), scours (1 litter), and accident or outside agency (1 litter). In 8 cases no reason for the losses is available, one litter was aborted, and one farrowing was not observed and the number born is not available. Of the 4 litters which had sufficient pigs to warrant recording 2 were withdrawn because the breeder was dissatisfied with carcass appraisal methods and 2 because scours had seriously affected the performance of the litter.

Results of Litter Recording

Of the 107 litters weighed, 26 (17 per cent. of total nominations) failed to reach the threshold standard, 9 have not proceeded to carcass appraisal (at the breeder's own discretion, because he had a ready sale for all as breeding animals or for other reasons), and 36 have yet to come forward to the hooks appraisal.

Tables 1 and 2 summarise the litter-recording results for 105 litters.

TABLE 1—LITTER RECORDING RESULTS: BREED SUMMARY

	No. of litters		Av. No. of pigs		Total at 3 weeks
Breed	Maiden	2nd or subsequent	Born	At 3 weeks	Litter weight
Large White	14	67	12.2	9.15	107 lb.
Berkshire	4	8	9.8	8.5	100
Tamworth	1	7	10.4	8.75	112
Large Black	1	1	10	8	119
Wessex	—	2	9.5	9.5	102
Total	20	85	11.7	9.0	107
Average of all maiden litters recorded			9.7	8.35	89

TABLE 2—NUMBER OF PIGS BORN, ALIVE AT 3 WEEKS, AND PERCENTAGE LOSS IN LITTERS BY SEQUENCE

	Litters					
	1st	2nd	3rd	4th	5th	6th or subsequent
Number born	10.3	11.9	12.3	12.8	12.1	12.0
Alive at 3 weeks	8.4	9.25	9.9	9.3	9.25	9.2
Loss to 3 weeks as percentage of total born ..	18	22	19	27	24	23

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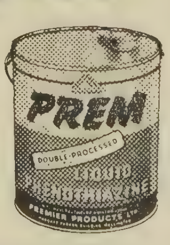

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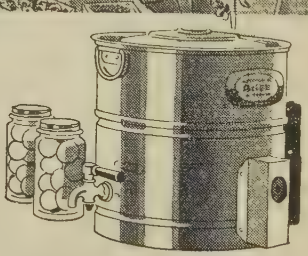

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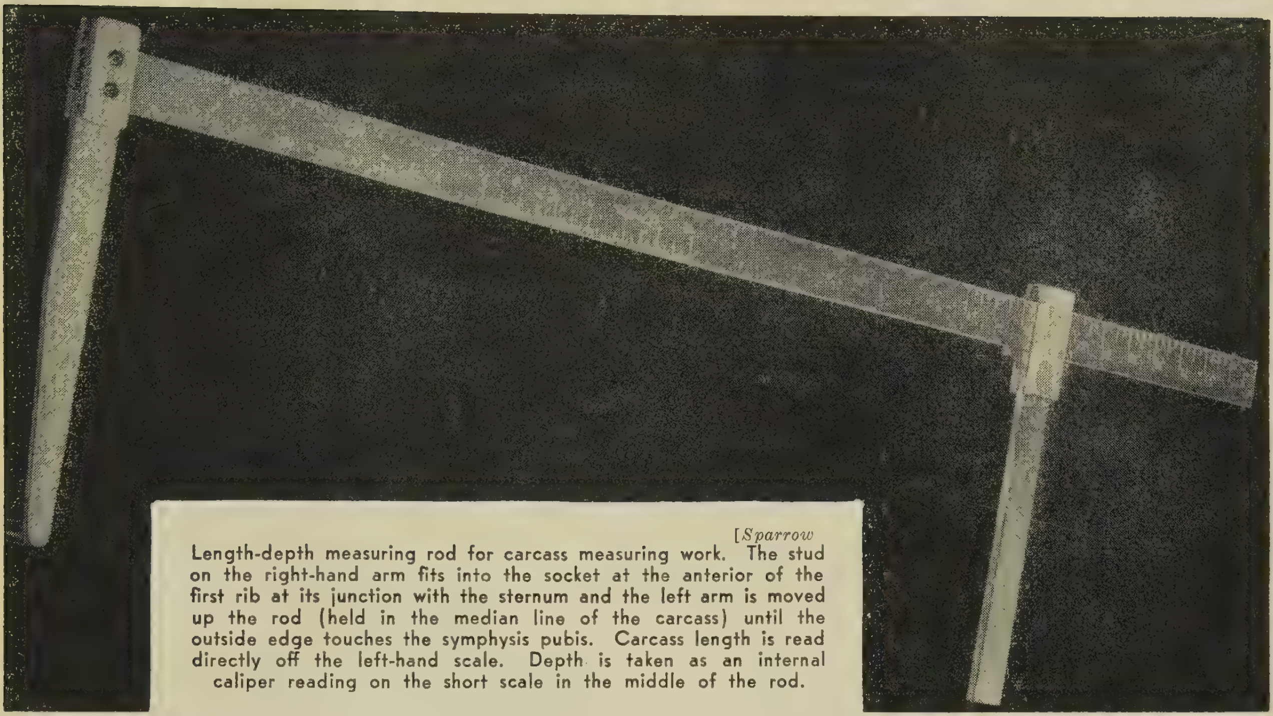


[*Sparrow*

Length-depth measuring rod for carcass measuring work. The stud on the right-hand arm fits into the socket at the anterior of the first rib at its junction with the sternum and the left arm is moved up the rod (held in the median line of the carcass) until the outside edge touches the symphysis pubis. Carcass length is read directly off the left-hand scale. Depth is taken as an internal caliper reading on the short scale in the middle of the rod.

In subsequent years it is hoped that the number of maiden litters in each breed will be large enough to make a separate averaging of their performances worth while. The number on this occasion is too small to give any basis for comparison either between breeds or between first, second, third, etc., litters from sows of each breed.

Of the 26 litters which failed at the litter-recording stage 15 failed to reach the required standard on weight alone, 4 on number of pigs remaining at weighing, and 7 on both counts.

Results of Carcass Appraisal

Thirty-six litters have now been fully evaluated, test pigs having been sent for carcass appraisal. To decide which shall appear in the merit list the following standards are applied:—

Class A: A minimum of 70 per cent. of the possible points must be reached for growth-rate and carcass quality taken together. The possible is 125 points, so the minimum requirement for this class is 87½ points (averaged over not less than two carcasses).

Class B: The same minimum is retained for carcass quality, but growth-rate standards are relaxed to allow pigs which score not less than 10 points out of 25 for rate of gain to qualify.

Details of litters which have qualified for either of these classes are set out in Table 4. Of the 21 which failed to reach qualifying standard at this stage two were represented on the hooks by only one pig. In each of these cases the carcass score was good; had a second pig been available for appraisal, these litters would probably have qualified. In 9 cases the required carcass standards were achieved but growth-rate was not sufficient to qualify for Class A, though one of these qualified for Class B. Nine more litters failed on both scores and 3 failed on carcass quality only. Over-fattening spoilt the chances of a few of the test pigs which otherwise would have had good carcasses.

Growth-rate Standards

The chief weakness in growth-rate was failure to maintain adequate growth after the 3 weeks' stage, which probably stems from the traditional reluctance of breeders to use the creep to full advantage. Weights of litters at 3 weeks and the average weights of pigs at this age have on the whole been good. Breeders who do not take advantage of this good start to maintain a growth-rate fairly close to the standard set are not securing the results, particularly in efficiency of feed conversion and lean meat development, of which their pigs are capable.

Department of Agriculture Bulletins

(Free)

No.
15, "Causes of Excessive Wastage in the Pig Industry".
230, "Castration of Pigs".
289, "Curd for Feeding Pigs".
302, "Rejection of Pigs by Works".
343, "Crops for Wintering Pigs".
364, "The Feeding and Management of the Sow and Litter".
366, "Production of Quality Pig Carcasses.
374, "The Ruakura Round Farrowing House".
389, "Early Weaning of Pigs".

The standards of growth-rate to secure A or B listing are quite moderate. They are set out in Table 3.

TABLE 3—STANDARDS OF GROWTH-RATE: MAXIMUM AGE FOR VARIOUS WEIGHTS

Dressed carcass weight (hot weight less 6 per cent.)	Class A	Class B
lb.	days	days
60	115	124
80	140	150
100	165	176
120 . ..	188	200
140	208	222
160	227	241

It may be argued that growth-rate is not synonymous with efficient food conversion, but it is fairly closely connected with it for reasons which were clearly set out in the article in the December issue of the "Journal". Further, when points for growth-rate are coupled with those for carcass quality, which would penalise any short, fat pig, there is a high degree of practical assurance that the strains which qualify under the on-farm performance Pedigree Pig Improvement Scheme will generally be economic producers of quality carcasses.

TABLE 4—PEDIGREE PIG IMPROVEMENT SCHEME: QUALIFIED LITTERS

Class A

(Maximum Points in Brackets: L., Loin development; B., Belly thickness; M., Marketing points)

Owner	Breeding of litter		Date born	Litter weight at 3 weeks	CARCASS TEST RESULTS (AVERAGE) POINTS											Total points
	Sire	Dam			Dead-weight	Growth-rate	Length	Backfat		Bal.	Ham	Sh.	L.	B.	M.	
								Sh.	Loin							
				lb.	lb.	(25)	(20)	(10)	(15)	(5)	(15)	(10)	(10)	(5)	(10)	(125)
H. E. Johnson and Co., Whangarei	L.W. 11492	L.W. 11777	28/11/56	183	150½	25	20	9+	*17½—	5	8½	6½	7	5	†4½	108
D. Reid, Wellsford	L.W. 12914	L.W. 13088	19/10/56	118	95	19	18	9+	8—	4½	12½	9	7	4	10	101
E. E. Russell, Waiuku	L.W. 13397	L.W. 13461	30/11/56	111	90	16	20	10	11—	5	11½	7½	8	4	5	98
H. and N. Myers, Mauriceville ..	L.W. 9855	L.W. 11911	26/11/56	151	76	15½	17½	9—	9½+	5	11½	7	6½	4	9½	95
H. and N. Myers, Mauriceville ..	L.W. 12978	L.W. 12056	3/12/56	125	88	25	18	7½—	12+	4	11½	6½	7½	4	8½	104
H. and N. Myers, Mauriceville ..	L.W. 12978	L.W. 12557	4/12/56	153	72½	17½	17	7½—	15	5	10½	8	7½	4	8	100
N.Z. Pig Producers Council, Te Awamutu	L.W. 12078	L.W. 13144	13/1/57	106	88	22	16	6½—	12½—	4½	11	6	7	3	5	93
E. W. Harrison, Palmerston North	L.W. 12824	L.W. 11166	17/1/57	121	73	25	16	5½+	14+	5	10½	7	8	3½	8	102
E. W. Harrison, Palmerston North	L.W. 12824	L.W. 12813	17/1/57	100	72	25	14	5½+	4½+	5	9½	7	8	3	8	89
E. W. Harrison, Palmerston North	L.W. 11290	L.W. 11646	1/2/57	‡81	80½	25	19	3½+	14+	5	11	7½	7½	2½	8	103
E. W. Harrison, Palmerston North	L.W. 14071	L.W. 13894	15/2/57	82	81	25	18	5+	11+	5	11	7	8½	4	10	104
E. W. Harrison, Palmerston North	L.W. 13704	L.W. 14242	29/4/57	90	71	22½	19½	7½—	9+	4½	11	8½	7½	2½	8½	101
Mrs. G. E. Allen, Whangarei ..	L.W. 14451	L.W. 14159	29/6/57	104	84	25	13	7+	12—	3	11	5	6	3	10	95

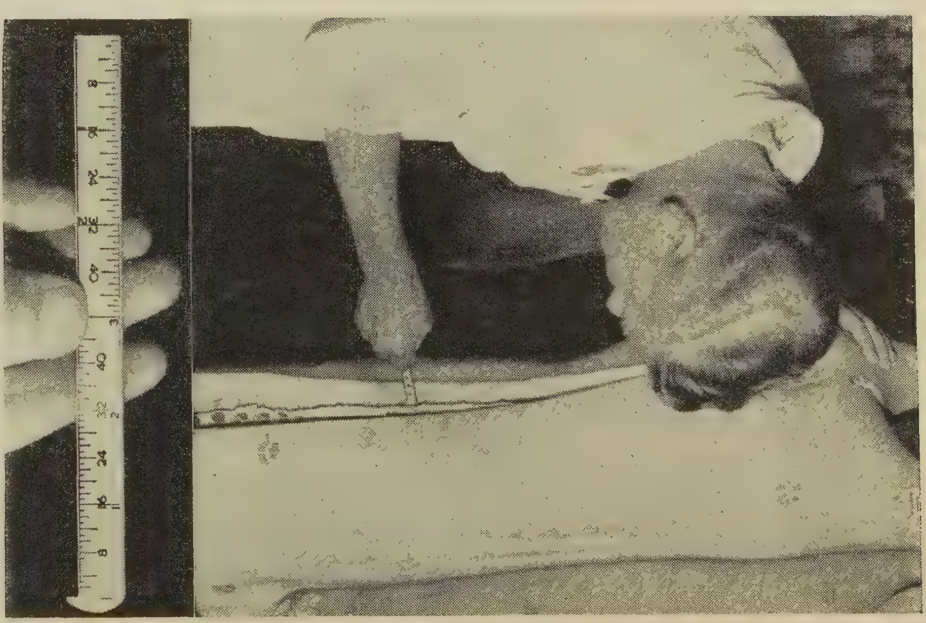
Class B

(Class A litter performance; growth-rate minimum 10; carcass minimum 70 per cent.)

Owner	Sire	Dam	Date born	Litter weight at 3 weeks	Dead-weight	Growth-rate	Length	Backfat Sh.	Backfat Loin	Bal.	Ham	Sh.	L.	B.	M.	Total points
N.Z. Pig Producers Council, Te Awamutu	L.W. 12078	L.W. 13478	25/1/57	122	68	10½	16	7—	11—	4½	10	7	8	4	7	85

* Maximum points 20 (baconers). † Maximum points 5 (baconers).

‡ This litter did not reach qualification standard at 3 weeks, but carcass appraisal was carried out because the sow had previously qualified with a litter by the same sire.



[*R. W. Orr*

Measuring loin backfat on baconer carcass with a backfat measuring gauge (inset). Graduated in sixteenths of an inch, the gauge is used to probe porker backfat (left end) through slits made over the appropriate vertebrae and to measure exposed backfat in backed-down baconer carcasses (right end).

This scheme does not give a basis for direct comparison between the strains recorded on different farms, but three immediate practical advantages can be claimed for it:—

1. It enables the breeder to check his management standards and correct any deficiencies.
2. It provides him with a better selection tool within his herd than he has had previously.
3. Though some animals do not get an opportunity to give the full performance of which they are capable, it can be safely assumed that those which qualify would also do well under standard testing station conditions. As a first step, therefore, these are worth using in pedigree herds.

By this it is not implied that the pedigree breeder will be able to dispense with culling on visual inspection. This will always be necessary, particularly for general constitution, feet, and teats.

However, it would be pertinent to suggest that agricultural and pastoral show classes in future should include mature classes which would be judged not only on the appearance of the animal and, in group classes, its progeny, but on all the available production records. These show classes are now well established for pigs in the United Kingdom, and New Zealand has a similar class ("Oaks") for dairy cattle. It is proposed that the pig breeders' and producers' councils approach the Royal Agricultural Society on this matter.

◆

Economic Comparisons of Farm Improvement Groups

By R. H. SCOTT,
Land Utilisation Officer, Department of Agriculture, Wellington

IN Taranaki, the Manawatu, and some South Island dairying districts groups of dairy farmers are co-operating with the Department of Agriculture in supplying information on their production, the capitalisation of their enterprises, and the returns which they are obtaining, and this article analyses such information resulting from operations in 1955-56 of individual farms in different groups in the districts mentioned.

▼ Feeding out silage on a farm in the Oaonui Farm Improvement Group during a very dry period in February 1955.

THE reason that figures are given for individual farms is that computed averages for each group of farms would actually represent no particular farm. The figures given are for the farm which is returning its owner the highest net return per acre for the group. Though the particular farm cannot be regarded as being representative of dairy farming in its district, a comparison between the higher-producing farms shows some district differences.

Carrying Capacity

All stock on the farms were converted to a common animal unit, the dairy cow in milk. To allow comparisons between groups the carrying capacity was computed on the basis of animal units per 100 acres of effective farm area. The area of some farms, particularly on the west coast of the South Island, included land which could not be used for farming and which could never be converted to farmable land. To give an effective farm acreage such areas were deducted from the area included in the title to the land.

TABLE I—ANIMAL UNITS PER 100 ACRES
(All stock converted to the unit—dairy cow in milk)

Group	Units
Oaonui	89
Rongotea	114
Collingwood	57
Takaka	56
Murchison	58
Rotomanu	53
Harihari	69

The Rongotea farm has the highest carrying capacity, the Oaonui farm has the next highest, and the Rotomanu farm has the lowest. However, all the farms are likely to increase their carrying capacities, particularly the Oaonui, Murchison, Rotomanu, and Harihari farms, on which land improvement work is to be done and which as completed will be reflected in increased output.

Butterfat Production

Butterfat production was computed "at the pail", and the number of cows in milk for the season for each farm comprised those which had milked for 100 days and over. Those cows which had milked for less than 100 days were excluded when the computation "average butterfat production per cow" was made.

TABLE 2—AVERAGE BUTTERFAT PRODUCTION

Group	Per cow lb.	Per acre lb.
Oaonui	310	236
Rongotea	284	239
Collingwood	390	195
Takaka	333	144
Murchison	260	111
Rotomanu	293	123
Harihari	314	164

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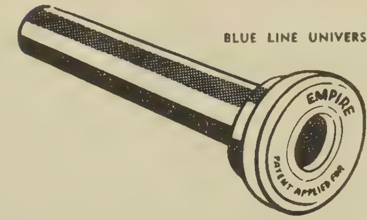

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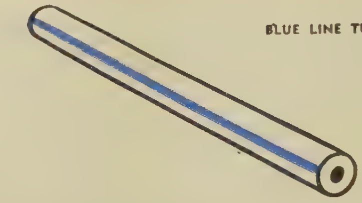

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Though the Rongotea farm had the highest butterfat output per acre, it was only a little ahead of the Oaonui farm, which had a significantly higher per cow production. The Collingwood property had the highest per cow production, but with an annual rainfall of about 150in. there were several land-management problems which handicapped intensive per acre output. The Murchison farm had the lowest production under both headings, but this district has the severest winters and the shortest growing season of all the areas compared. Again, output per acre on most of the farms will increase as further land improvement work is undertaken.

Farm Capitalisation

To arrive at the capital structure of the farms, the following values were used:—

Livestock: A conservative sale value was adopted. However, this standard value has been used for several years and is now considerably below the ruling market rates for similar classes of stock.

Plant and equipment have been valued on the basis of normal resale value; that is, what it is likely to realise if sold.

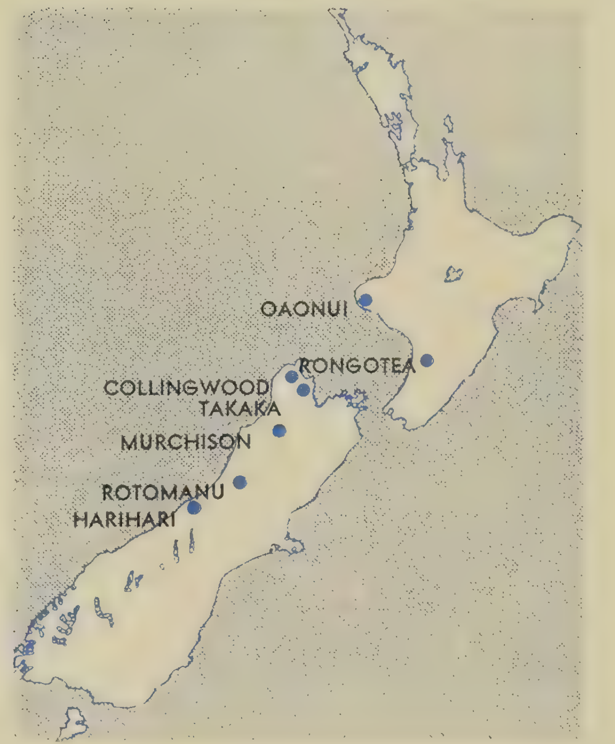
Land, buildings, and improvements: The latest Government valuations for these were used.

TABLE 3—FARM CAPITALISATION PER ACRE

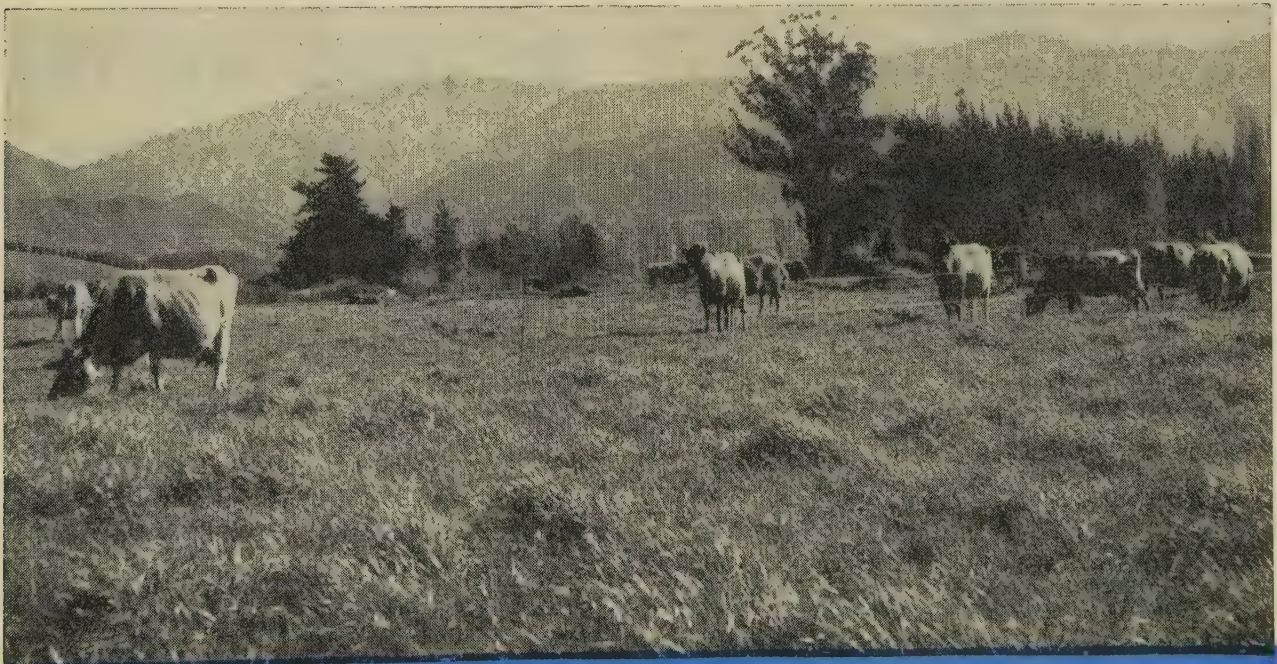
Group	Livestock, plant, and equipment		Land and improvements		Total	
	£	s.	£	s.	£	s.
Oaonui	36	18	78	14	115	12
Rongotea	43	16	112	12	156	8
Collingwood	33	8	73	2	106	10
Takaka	26	0	77	4	103	4
Murchison	27	4	47	2	74	6
Rotomanu	26	2	33	2	59	4
Harihari	33	4	25	8	58	12

With a lower standard of farm building and other improvements on the land the Murchison and two Westland farms had the lowest per acre capitalisation. In one of the latter the per acre capital investment in livestock, plant, and equipment was actually greater than the per acre investment in real estate. Real estate represented over 65 per cent. of the total investment for all farms except the Murchison and Westland farms.

FARM IMPROVEMENT GROUPS



The districts in which the farm improvement groups were studied.



Part of the dairy herd on a group farm in the Takaka Valley.

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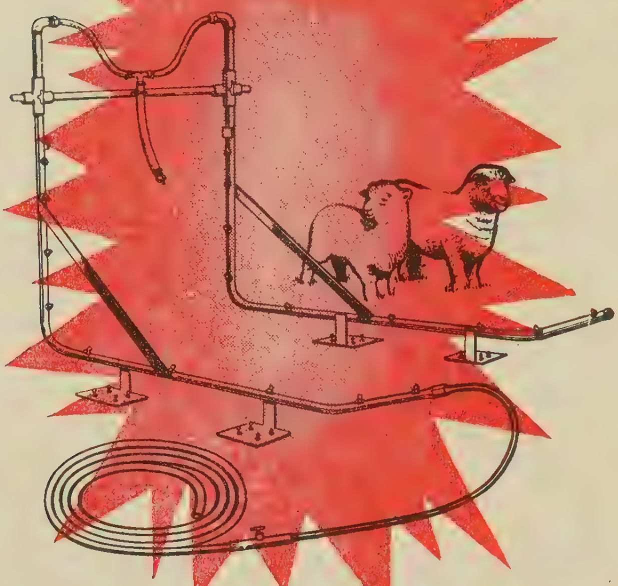

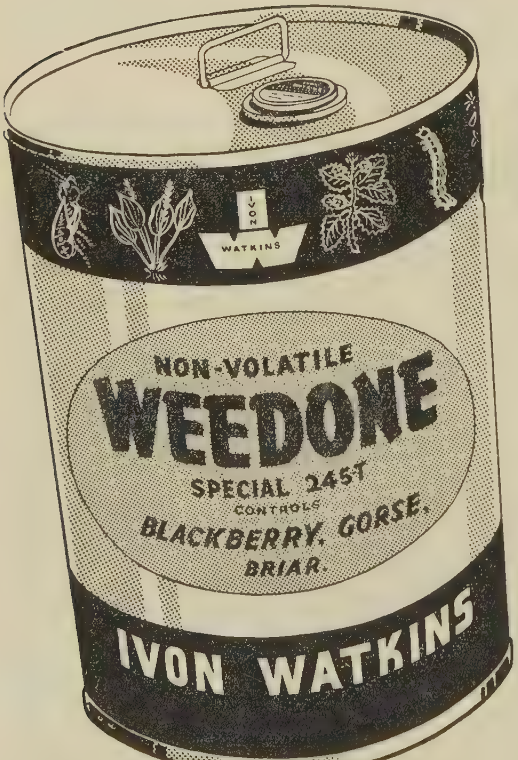

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Gross Output

Gross output includes everything that has been produced for sale on the farm during the year. It is arrived at by adjusting the gross sales for any changes in the valuation of livestock at the beginning and end of the year. For instance, on one farm the gross output was £2774, arrived at as follows:—

	£	£
Sales—		
Butterfat	2,242	
Pigs	319	
Cattle	35	
Bobby calves	43	
		2,639
Value of livestock at beginning of year ..	1,347	
Value of livestock at end of year	1,482	
Add increase in value		135
Gross output		2,774

Gross output per 100 acres as shown in Table 4 gives an indication of the intensity of farming.

TABLE 4—GROSS OUTPUT PER 100 ACRES

Group	£
Oaonui	4,172
Rongotea	4,168
Collingwood	2,869
Takaka	2,720
Murchison	2,153
Rotomanu	2,260
Harihari	2,762

Owner Surplus

A high gross output per 100 acres does not necessarily guarantee a high net profit, since output is sometimes obtained at too great a cost. A figure which takes into account the inputs necessary to achieve the return is required to measure the economic success of an enterprise.

For these farms an index "owner surplus per 100 acres" has been computed. This is arrived at by deducting from gross farm output the farm running expenses, depreciation on assets, and interest at 5 per cent. on the value of assets as assessed above (land, improvements on the land, stock, and plant). The remainder has been defined as owner surplus and is the amount available to an owner to meet his own labour and management reward, taxation, and any reinvestment he may wish to make in the enterprise.

TABLE 5—OWNER SURPLUS PER 100 ACRES

Group	£
Oaonui	2,120
Rongotea	1,780
Collingwood	1,040
Takaka	1,025
Murchison	431
Rotomanu	974
Harihari	655

For the Oaonui farm the owner surplus represents 51 per cent. of the gross output of the farm against 20 per cent. for the Murchison farm.

Return to Capital

To obtain an indication of the comparative profitability of the farms a return to capital and management was computed. From the gross output has been deducted farm running expenses, depreciation on assets, and an allowance for the operator's own labour, assessed at £624 per annum. The resulting figure expressed as a percentage of the total capital investment gives a return on the investment.

TABLE 6—RATE OF RETURN TO CAPITAL AND MANAGEMENT

Group	per cent.
Oaonui	18.3
Rongotea	8.0
Collingwood	7.5
Takaka	9.0
Murchison	5.6
Rotomanu	16.8
Harihari	4.6

As the capitalisation of the enterprises as assessed is probably about a quarter to a third below the figure at which the respective farmers value them on a walk-in walk-out basis, the return to capital and management is below that shown in the table, and for the Murchison and Harihari farms there would be a very low return, approximately 1 to 2 per cent. on the investment. The return for the Oaonui farm would be approximately 12 per cent.

No serious attempt has so far been made to analyse the differences in the results achieved on the farms. Some are due to climatic, soil, and topographic variations, whereas some are due to management differences; that is, the efficiency in using and combining the resources available. As information becomes available over a longer period an analysis of the economic and management data may give a lead on how to use and combine the resources more efficiently to achieve greater net returns.

☆

Radio Broadcasts for Farmers

RADIO broadcasts for farmers during March will be given as follows:—

2ZA Palmerston North, 12.33 p.m.

10 March—"Pasture Topdressing in the Manawatu", by J. A. Graham, Fields Instructor, Department of Agriculture, Palmerston North.

17 March—"Trends in Spray Application", by G. N. Paulin, Horticultural Instructor, Department of Agriculture, Palmerston North.

24 March—"Maintenance of Field Drainage Systems", by K. L. Mayo, Field Drainage Officer, Department of Agriculture, Palmerston North.

31 March—"Laboratory Tests and Field Strikes", by A. V. Lithgow, Officer-in-Charge, Seed-testing Station, Department of Agriculture, Palmerston North.

4YA and 4YZ Invercargill, 12.33 p.m.

3 March—"Flock Replacements", by A. W. J. Apps, Livestock Instructor, Department of Agriculture, Palmerston.

10 March—"Autumn Topdressing", by S. M. J. Stockdill, Fields Instructor, Department of Agriculture, Palmerston.

17 March—"Soil Moisture Requirements", by J. P. Widdowson, Research Officer, Department of Agriculture, Alexandra.

24 March—"Wool Improvement", by W. F. Dick, Sheep and Wool Instructor, Department of Agriculture, Invercargill.

31 March—"Farm Buildings", by L. H. Weston, Machinery Instructor, Department of Agriculture, Dunedin.

4YZ Invercargill (following joint programme from 4YA and 4YZ)

3 March—"The Golden Fleece", by W. F. Dick, Sheep and Wool Instructor, Department of Agriculture, Invercargill.

10 March—"Land Usage", by O. Sly, Soil Conservator, Department of Agriculture, Invercargill.

17 March—"Land Capability Farming" by O. Sly, Soil Conservator, Department of Agriculture, Invercargill.

24 March—"The Stock Act", by C. E. Isaacs, Veterinarian, Department of Agriculture, Invercargill.

31 March—"Lambs on Pastures", by W. Faithful, Instructor in Agriculture, Department of Agriculture, Invercargill.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month at 12.33 p.m.), Thursdays at 12.33 p.m.

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m., Wednesdays at 12.33 p.m. and 6.50 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

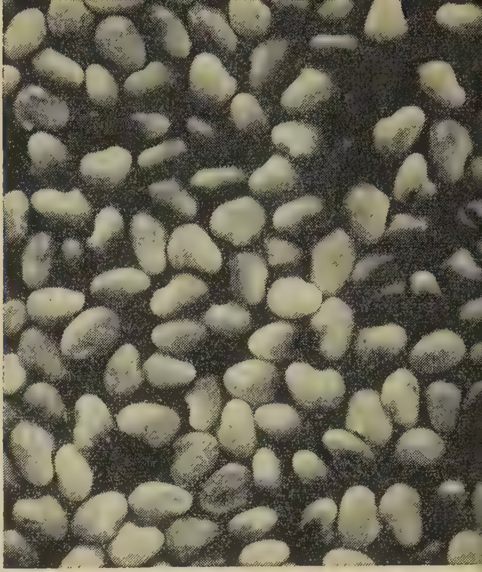
4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m. and 7.15 p.m. (Lorneville and Gore stock market reports), Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m.

◆

Seed Production in New Zealand

Montgomery Red Clover

By J. D. WRAIGHT,
formerly Fields Instructor, Department of Agriculture, Timaru



Montgomery red clover seed.

MONTGOMERY red clover (*Trifolium pratense*), a late-flowering variety of the well-known red clover species, owes its popularity to its relatively persistent nature. The seed is very similar to that of cowgrass (broad red clover), but the habit of growth is quite different. Cowgrass is an early-producing, open-crowned, tall-growing variety; Montgomery red clover is later producing, has a dense rosetted crown with a shorter growth habit, and bears a greater percentage of leaf to stem. It is this dense crown which enables Montgomery red clover to stand up to hard grazing, particularly by sheep, as even after very heavy grazing the crown of a plant shows little or no damage and the plant is able to recover well.

THE colour and formation of flowers of Montgomery red clover differ little if at all from those of other varieties. The root system consists mainly of a sturdy taproot, which enables the plant to penetrate stiff soils for its supply of moisture and plant food and allows the plant to flourish on all but the driest soils during summer.

Place in Agriculture

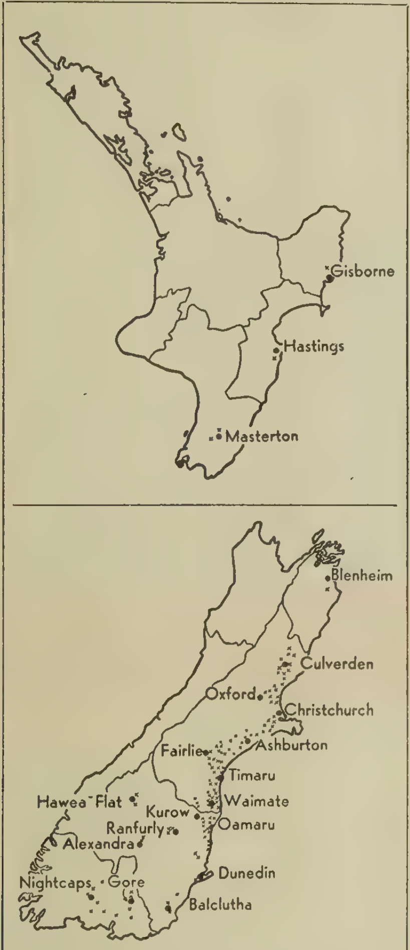
The period at which leaf production of Montgomery red clover starts in spring has a direct bearing on its use as a valuable pasture constituent. It comes away somewhat later in spring than do ryegrass, white clover, and cowgrass, beginning useful production in October. Leaf production increases from late spring to its maximum in midsummer and falls off during autumn. If autumn growth is left over for light winter grazing, it stands up to cold very well and is reasonably resistant to frost.

Because of its late period of production some criticism has been levelled at Montgomery red clover, the critics claiming that it comes away too late in spring to be of real value as a

Montgomery red clover grown for seed production.

pasture plant. Montgomery red clover should be viewed as only an ingredient rather than the main species in a pasture mixture, for as a constituent it plays a very valuable part in the season's production, providing feed during summer when other pasture constituents such as white clover and ryegrass have ceased production and will not contribute much feed until autumn.

In that way Montgomery red clover has gained a reputation for providing a large measure of reliability in a pasture, and according to requirements it is used in varying quantities in many types of seed mixtures. For ordinary permanent pasture mixtures it is included at 2lb. to 3lb. an acre in association with the usual species, including perennial ryegrass, white clover, and crested dogstail.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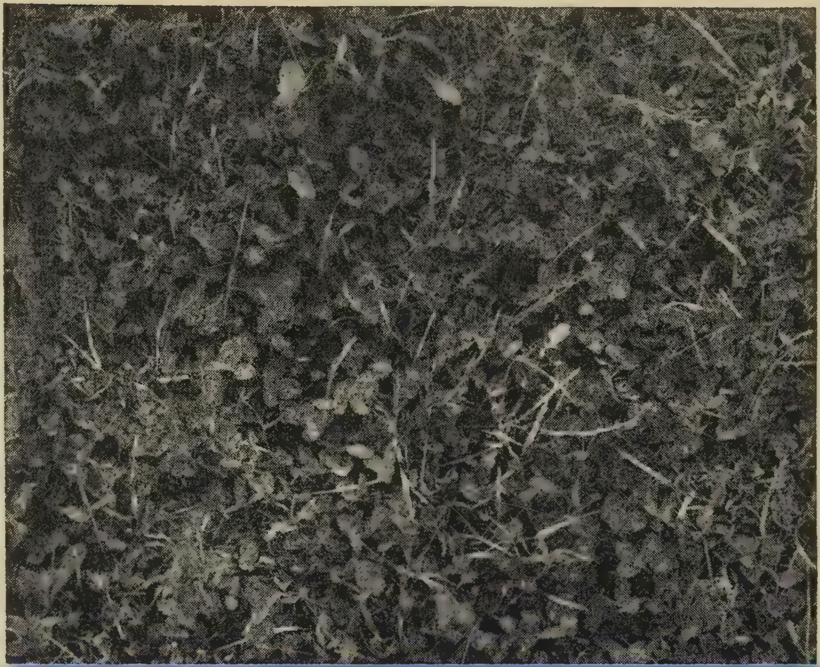
Hawea Flat
Kurow
Waimate
Ranfurly
Oamaru
Alexandra
Dunedin
Nightcaps
Gore
Balclutha

The districts where Montgomery red clover seed is harvested are shown by crosses.

For dry-land pastures which must stand rigorous summer grazing Mont-



A Montgomery red clover sward evened up by grazing before the area is closed for seed.

▼ The saving of Montgomery red clover for seed on very heavy land is not recommended because a large bulk of growth is produced and the clover tends to smother itself out.

Montgomery red clover and Italian ryegrass cut for hay before the area is closed for seed. Montgomery red clover is seldom sown without some association of ryegrass, as it is unpalatable to stock if sown without ryegrass and difficulties are experienced in controlling large areas by sheep grazing before the areas are shut for seed.

gomery red clover is included at 4lb. to 5lb. an acre, with cocksfoot (up to 10lb. an acre) and smaller quantities of other species such as white clover and perennial ryegrass.

With short-rotation ryegrass or Italian ryegrass at about 30lb. an acre, 4lb. to 5lb. of Montgomery red clover gives very useful short-term pastures which fit in well with some types of farm rotations.

Introduction to New Zealand

During the period of pasture improvement which began in New Zealand in the late 1920s it was found that improved strains of perennial ryegrass, white clover, and cocksfoot could not in themselves give maximum grazing over the whole grazing season and that some clover species which would give summer production was required to complete the number of useful and improved strains which could be offered to farmers. It was realised that cowgrass was useful in this respect, but that it was too short lived and was more useful as a hay species.

Small quantities of Montgomery extra late-flowering red clover, as it was then known, were imported in the late 1920s and grown in Canterbury, where the species was soon found to be useful for the production of summer feed. Seed produced in Canterbury was bought by farmers elsewhere in New Zealand, and before many years the clover was accepted as a very useful pasture ingredient in that it could be grazed or could be used as a hay or seed crop, recovering quite well from either of these crops and producing excellent aftermath feed.

The first two areas entered for certification were one in Canterbury and one in Otago. The Canterbury area was of 2 acres, sown in the Leeston district in the spring of 1929. It was harvested in the 1931-32 season, yielding 517lb. of machine-dressed seed. The Otago area was in the Maungawera district, near Wanaka. This area of 7 acres was sown in the spring of 1930 and was harvested in the 1931-32 season, producing 2207lb. of machine-dressed seed.

Subsequently areas were sown for seed production in various parts of Canterbury, Otago, and Southland, and later in the North Island. The species was tried out on many types of country, ranging from the shingle plains to the alluvial flats, but as a seed producer it has proved to be most successful on the rolling clay country of Canterbury, Otago, and Southland.

As the practice of seeding Montgomery red clover areas increased a good export market was found for the seed, and its ready sale indicates that it is obviously meeting with favour as a pasture clover overseas. Reports show that it has been generally accepted in the British Isles, as it produces plants indistinguishable from British-grown Montgomery red clover.

Effect on Farming Practice

In arable farming districts with 25in. of rain or less mixed farming is usually practised, as the growth of grass is not sufficiently reliable for land to be stocked to the maximum. Thus cereal crops and seed production provide an important part of the mixed income.

The relationship between small seeds production and sheep carrying capacity was revealed in an investigation which showed that farmers who had developed some seed production had also been able to enlarge their flocks because of increased reliability of their pastures. A large measure of this reliability of production under difficult climatic conditions was the result of the use of Montgomery red clover, areas of which were sown mainly with seed production in view.

Districts Suitable for Seed Production

Seed production of Montgomery red clover has been established mainly in the South Island and in districts with reasonably good weather for the harvesting of the crop. Those conditions are to be found in Hawke's Bay, Marlborough, Canterbury, North Otago, and the drier parts of the remainder of Otago.

In Marlborough it was found that so much cowgrass was harvested that this district was not entirely suitable for the production of pure seed of Montgomery red clover because of cross-pollination and volunteer growth of cowgrass, with the result that the acreage grown there is small and maintained only in areas free from contamination. In the other districts cited good isolation of crops is possible and large areas of Montgomery red clover are entered for certification.

Climate and Soil Requirements

The climatic conditions most suitable for seed production of Montgomery red clover are those occurring in Canterbury and similar districts in a normal season with a rainfall of about 25in. a year, mainly in winter, spring, and early summer, a fairly high sunshine record, and good summer conditions.

Too little rain in winter and spring will cause lack of growth before the shutting of the seed areas, and too much rain in summer will cause a rush of growth which prevents normal flowering and seed setting. During autumn and early winter dry conditions with some frosts are most helpful in cutting back leaf growth and generally simplifying harvesting.

The soil conditions required for the best establishment and growth of Montgomery red clover exist on the medium-quality clay downs soils, as the most essential requirement of the plant is a cool, moisture-retaining subsoil. It is fairly tolerant of the acid soil conditions on this type of land, but responds outstandingly to applications of lime and, like all the useful clovers, requires frequent applications of phosphatic fertiliser to ensure maximum production.

Montgomery red clover persists fairly well on the light, dry, shingly plains soils, but the leaf growth tends to wilt badly in times of drought. On the other hand, on the heavy, deep, loam soils a pure or dominantly red clover sward, if mismanaged, tends to produce too much bulk and is inclined to smother itself out. In this respect the heavy soils are more suitable to the seeding of cowgrass, which can be controlled mainly by the taking of a hay crop and then being allowed to seed.

Soil requirements are closely associated with agricultural practice, and this applies particularly to the use of Montgomery red clover. On the soil type best suited to the establishment and growth of Montgomery red clover the agricultural practice is sheep grazing and mixed farming, with paddocks of 20 to 30 acres and frequently larger. Under such conditions Montgomery red clover is easily controlled by being grazed, and surplus growth can be converted into a manageable seed crop without undue damage to the pasture through smothering.

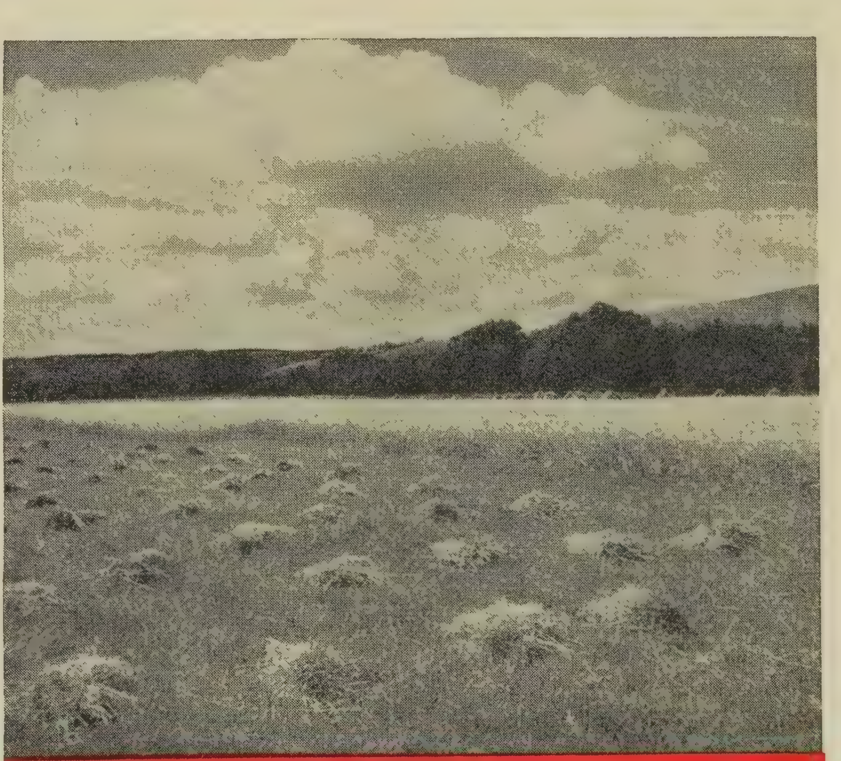
Place in Rotation

Seed stands or pastures which have been used as such fill quite a useful place in a mixed farm rotation, particularly in one based on 3 to 4 years in pasture followed by three or four cash or fodder crops before sowing out again to pasture. Run-out red clover stands provide excellent conditions for wheat, linseed, and other cash crops, and the increased fertility of the land after the growing of red clover is reflected in higher yields.

The establishment of red clover fits in well with the average mixed-farm rotation in that it can be sown out in spring under a cereal crop or with rape and other supplementary feed crops planted in late spring.

Area to Close for Seed

As seed is produced mainly under mixed farming conditions, the acreage which can be saved for seed depends largely on the feed position at shutting-up time. If a surplus of feed is certain, considerable areas will be



Montgomery red clover can be established successfully with a wide variety of cover crops. Here the clover seed was sown with oats.

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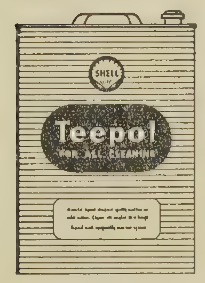

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closed for seed. This applies as much to Montgomery red clover as to the principal seed crops, ryegrass and white clover. The 1947-48 season in South Canterbury demonstrated this very well: Because of dry conditions the feed position was acute, with the result that only a small acreage of red clover was harvested for seed.

Another limiting factor to production of red clover seed is the population of bees in any district in relation to the acreage of clover being saved for seed. In years of very large acreages seed yields are disappointing, which is attributed to insufficient bees working on the clover at flowering time. In damp years white clover persists in flowering at the same time as red clover and offers considerable competition, because the honey bees show a definite preference for white clover nectar.

Seeds Mixtures

Seeds mixtures vary, depending on the length of life required from a seed stand and on the time and method of sowing. For areas sown out either into established cereal crops in spring or with rape or supplementary feed the usual mixture is 20lb. to 30lb. of perennial ryegrass, depending on its germinating capacity, 4lb. to 5lb. of Montgomery red clover, and 2lb. to 3lb. of white clover. For areas sown without a cover crop (usually in early autumn) on fallowed land 10lb. to 15lb. of perennial ryegrass, depending on its germinating capacity, and 4lb. to 5lb. of Montgomery red clover are used.

The reason for the difference in the quantities of ryegrass in the two mixtures is that sowing with a cover crop tends to repress grass growth and consequently a high seeding is required for sufficient ryegrass establishment.

Montgomery red clover is seldom sown without some association of ryegrass, as it is found to be unpalatable to stock if sown without ryegrass and difficulties are experienced in controlling areas by sheep grazing before the area is shut up for seed. Cocksfoot and other summer producing species are not used as associate grasses with red clover seed stands, as they produce too much bulk of leaf in summer to allow free flowering of the clover.

Cover Crops

Montgomery red clover's ability to establish well under a number of cover crops has been a big factor in the rapid expansion of its general use. For years after it was introduced Montgomery red clover was oversown in spring on to autumn-sown or winter-sown wheat, and gradually other cover crops also came to be used in its establishment. It is now used for sowing down under oats, barley, linseed, and linen flax. (The pulling of the linen flax crop does not disturb the grass and clover seedlings.)

When sown down with rape and other supplementary crops Montgomery red clover establishes well and comes away rapidly after the feed crop has been eaten off.

Time and Method of Sowing

The time of sowing depends not only on the factors which will influence the growth and establishment of the red clover plants, but also on the effect of other species included in the seeds mixture. When sown by itself Montgomery red clover will establish well on a good seed-bed as late as the end of March, but when it is sown late in a mixture with ryegrass the ryegrass establishes well at the expense of the clover plants, which are suppressed and subject to frost lift.

In a sowing trial conducted at Lincoln a mixture of ryegrass and red and white clovers was sown at the beginning of each month from October to April. In the following autumn counts were made of the number of red clover plants in each sowing and the results were:—

Date of sowing	**Average number of red clover plants per square yard**
October-December ..	63
January-February ..	16
March-April	2

For Otago and Southland conditions December and January have been found to be the most satisfactory sowing months.

Red clover seed may be sown broadcast or drilled in lightly through coulters, according to the soil conditions at time of sowing; for either method it is important that the land be well consolidated, and for evenness of depth it is wise to sow on a rolled surface.

If conditions are dry, drilling the seed into the tilth where some moisture will be found is preferred, but under normal conditions broadcasting followed by harrowing gives excellent results. A recently produced drill coulter allows the seed to be broadcast just beneath the surface of the soil, and under the difficult, dry conditions sometimes experienced in Canterbury this method of sowing has been very successful.

Lime and Fertilisers

As most of the country suitable for the seeding of red clover is slightly acid, successful clover establishment and growth depend largely on applied lime. Regardless of previous applications of lime, most stands receive a further dressing of a ton an acre when sown down and maintenance applications during the life of the pasture.

Some idea of the importance of lime to the establishment of Montgomery red clover can be gained from an observation carried out by Canterbury Agricultural College in 1936, when a pasture mixture consisting of 25lb. of perennial ryegrass, 7lb. of cocksfoot, 3lb. of red clover, and 2lb. of white clover was sown, part on land which had received no lime, and part on land which had received 2 tons of lime an acre 12 years previously. An analysis of the pasture in the second autumn, when it was 15 months old, gave the following percentages:—

	Limed area per cent.	**Unlimed area** per cent.
Ryegrass ..	60	90
Cocksfoot ..	5	5
Red clover ..	20	4
White clover ..	15	1

Seed production can be assisted by the application of phosphate both at sowing down and as a topdressing on the established seed stand. Spring applications of about 2cwt. of superphosphate an acre increase seed yields and also hasten maturity of seed crops.

Treatment before Closing

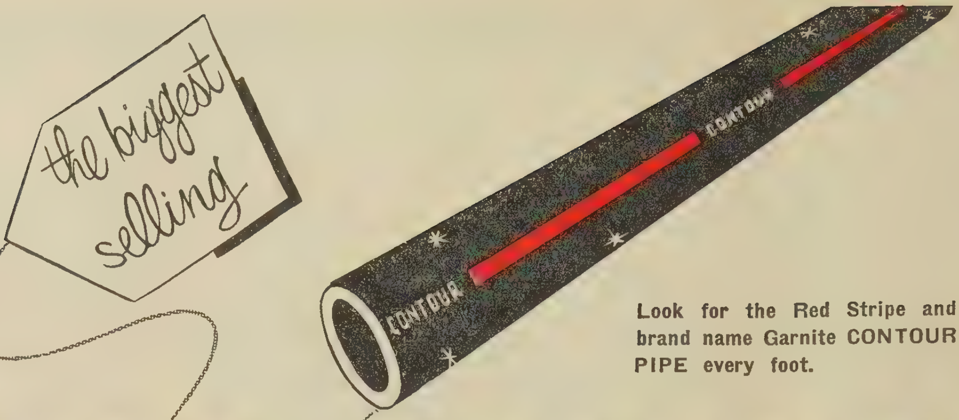
The treatment of Montgomery red clover stands before they are closed for seed varies with the soil type and the size of the paddocks. On heavy land and on a small area hay is frequently taken and the aftermath growth saved for the production of the seed crop. In that case the area is grazed only lightly in very early spring and the bulk of the spring growth is conserved for the hay crop.

On the other hand, large areas on medium to light land are grazed, usually with sheep, and then allowed to go to seed. Such grazing is usually light in early spring, and as soon as vigorous production begins in October heavy grazing is maintained to keep the growth under control until the field is closed.

Time of Closing

The time of closing Montgomery red clover stands varies with the season and the amount of rainfall in winter and spring. In a dry season when growth has been poor most grazed stands will be closed between the end of October and the middle of November, but in years of adequate rainfall closing the stand before the middle of December may cause growth to be too rank.

With hayed stands the position is somewhat similar. When spring growth is vigorous the hay crop can be taken in late November and, provided the hay is off the area by the early part of December, sufficient aftermath growth will take place to make a seed crop. In dry years an early and probably light cut of hay is taken in October and the stand



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On large areas the crop is usually direct headed, and this is not done until the leaf growth has disappeared and the crop is fit in both stalk and seed head.

allowed to recover as early as November.

Once a stand of Montgomery red clover has been shut for seed it is not usual or wise to allow any stock to run over the stand, as all clover growth is much relished by stock at this time.

Treatment after Closing

It is not usual to have to give any treatment to a red clover stand once it has been shut for seed, but when the growth has become uneven because of preferential grazing by sheep, or when heavy rain falls after the area has been shut, with consequent rapid growth of clover, topping the stand with a mower has had quite good results. Topping tends to even growth and results in more even flowering and ripening of the seed throughout the stand.

Irrigation

The value of irrigation to a pasture species such as Montgomery red clover when it is grown for a seed crop on light, dry soils is generally appreciated, and under irrigation seed stands behave as well as they do on better soils. Montgomery red clover is an excellent indicator plant for the irrigation farmer, as it shows signs of wilting as soon as soil moisture becomes low, but growth will fall off if the stand is over-irrigated.

Irrigation methods for seed stands of Montgomery red clover depend largely on rainfall for the season, but on light, porous soils stands are usually watered in autumn and again in spring before being closed for seed. Unless conditions are unusually dry, there is little need for irrigation after the area has been closed for seed, as it tends to cause too great a growth of leaf.

Irrigation is very beneficial to a red clover stand after the seed crop has been taken, as it assists materially in the recovery of the plants.

Harvesting the Crop

Very little seed is set after the end of March because of colder conditions and frosts, and the time of harvest depends on the weather experienced after seed setting. In dry years there is little second growth of leaf to hinder harvesting, so the crop may be harvested in March and April. In a wet autumn second growth of leaf is troublesome and retards harvest until heavy frosts have cut back the leaf growth.

The method of harvesting a crop of Montgomery red clover depends on size of area and conditions at harvest time. For example, small areas carrying some leaf growth may be cut with an ordinary or side-delivery mower and either picked up and threshed from the paddock or stacked to be threshed later in the year. On larger areas it is not practicable to employ this method, and usually the crop is direct headed, which is not undertaken until the leaf growth has disappeared and the crop is fit in both stalk and seed head.

Some loss of seed results from waiting until all the crop is fit for direct heading, and under unfavourable conditions probably the best method would be to mow the crop as soon as the seed is coloured in the latest-set heads, and then after a period of some days to pick up and thresh with a header harvester.

For the maximum amount of seed to be saved threshing must be done only in sunny weather and after the dew has dried off the standing crop or the swath. In the late afternoon dew-fall causes unfitness and consequent difficulty in threshing. Clover which has been mown and has become wet may be lifted mechanically with a swath lifter or aerator, which lifts the rain-battered swath off the ground and assists materially in drying out the crop. After lifting, threshing can usually be proceeded with almost immediately.

A recent development in harvesting the crop is the use of leaf defoliant or crop-desiccant materials to reduce leaf growth and hasten the maturity of the seed heads. This avoids the necessity of having to wait until frosts or suitable conditions reduce the leaf growth before harvesting can proceed. The materials used are phenols of the DNBP and DNAP mixtures, which are

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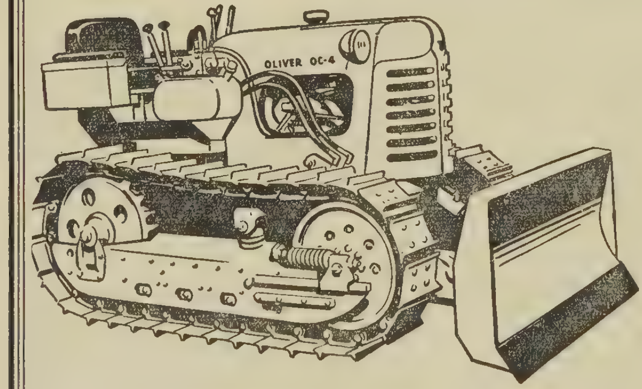

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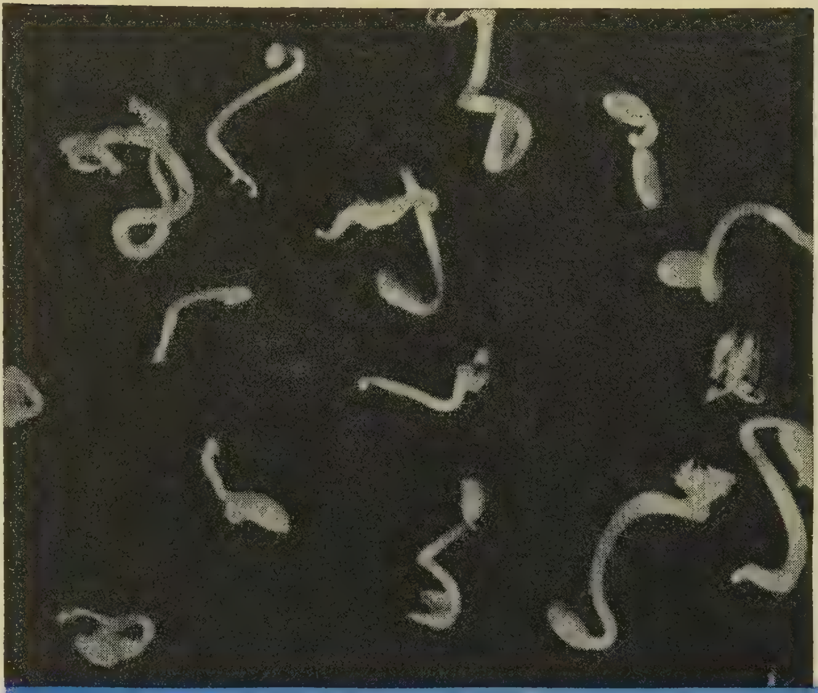


[*Elmar*

Seed that is threshed too hard may often produce abnormal seedlings, several types of which are shown above.

applied with diesel fuel oil with a low-volume sprayer, and the effect of defoliation is very rapid. Harvesting can be undertaken within a few days from treatment.

Setting of Machine

Much damage has been caused to seed by improper settings of the drum or riddles, particularly in header harvesters, and this damaged and chipped seed causes loss and probable impurity in machine-dressed seed. The proportion of seed with visible damage is also an indication of even more serious though invisible damage to other seed. This unseen damage results in such seed producing abnormal seedlings because of injury to the internal parts of the seed such as the cotyledon. These seedlings fail to produce normal plants and usually die at a very early stage.

Damage may be caused in several ways: The drum speed may be too high or the use of too fine a riddle setting may cause too great a proportion of the seed to be returned to the drum for rethreshing. In other cases it may be the result of too close a setting of the drum to the concave, or of the use of worn-out drum beater bars.

Damage is frequently associated with the threshing of material which is out of condition when an attempt is made, by altering the machine setting, to obtain the maximum extraction of seed. The only remedy then is to defer operations until conditions are more satisfactory, even if this necessitates delay and modification of the threshing programme.

Clean threshing and sound seed can be achieved if the operator is prepared to thresh only when the crop is sufficiently dry, and as the product is valuable, care should be taken to ensure that the maximum extraction is obtained without damage to the seed.

Yields

Yields of Montgomery red clover are causing some concern to seed growers. Individual areas often give yields exceeding 200lb. of machine-dressed seed per acre, but the average yield is much below this figure, and has fallen appreciably since the first years of seed harvesting of this crop.

Generally the best seed yields come from first-harvest areas, and the yields fall off as the pasture ages. Lower yields may be due in part to the effort of growers to take seed from old and run-out areas.

Montgomery red clover has always been recognised as producing a lower seed yield than cowgrass, perhaps owing to its later seed setting and ripening. It is also known that season plays a big part in influencing the average yield of Montgomery red clover seed, but there appear to be other factors contributing to the drop in seed yields noticeable over the years. So far a fully satisfactory explanation of these factors has not been possible.

Impurities in Seed

The header harvester now provides practically the sole means of harvesting red clover, and samples "off the header" are not nearly as clean as were those from clover shellers or threshing mills. This is because of the reduced riddle capacity of the travelling harvester. Samples generally contain more pug (clover pods and broken-up leaf and stems), so losses in dressing are larger than those in seed threshed by mills.

The chief impurities of red clover seed are broken, damaged, and sprouted seeds, which, with husks and dirt particles, are classed as inert matter.

Weed seeds which are difficult to extract completely in the machine dressing of a line of red clover seed are ribgrass (*Plantago lanceolata*), dock (*Rumex obtusifolius*), and sheep's sorrel (*Rumex acetosella*), though dock and sorrel seeds are now less prevalent in machine-dressed samples than they were before improved methods of machine dressing were evolved in recent years. The seed of dodder (*Cuscuta epithymum*), a parasitic plant which attacks red clover, is difficult to eradicate from a sample of machine-dressed seed, and as the importation into some countries of seed containing this impurity is prohibited, its presence in a line lowers the value.

Origin of Strains

The original strain of Montgomery red clover introduced from England was known as a late-flowering or single-cut type. This type was carried on under the certification scheme until a selection was made by the Grasslands Division of the Department of Scientific and Industrial Research of a type with a longer period of maximum production.

An English pedigree strain, bred by the Aberystwyth Plant Breeding Station and identified as S123, was introduced into New Zealand in 1938, but this strain had rather a short-growing habit and showed no superiority under New Zealand conditions. Selection work by the Grasslands Division is continuing. Supplies of the New Zealand pedigree strain were first distributed into commerce in 1939, when the first release of certified Government Stock seed was made. This pedigree strain has rapidly replaced the original strain introduced from England.

Seed Certification

The certification of Montgomery red clover seed is aimed at producing seed of a high standard of trueness to type. Purity of strain is controlled carefully by paddock inspections closely correlated with origin of the seed sown and plot tests of samples of the seed harvested. Subject to satisfactory field and plot reports, the following grades of seed are certified:—

Pedigree seed: Harvested from areas sown with Government Stock seed distributed by the Department of Agriculture from nucleus stocks produced by the Grasslands Division of the Department of Scientific and Industrial Research.

Mother seed: Harvested from areas sown with Pedigree seed.

Standard seed: Harvested from areas sown with Mother seed.

The final purity required of all machine-dressed certified Montgomery red clover seed before it is tagged and sealed is 96 per cent., with a maximum of not more than 1 per cent. of weed seeds.

The area of Montgomery red clover entered for certification reached a peak of almost 28,000 acres in the 1945-46 season, but since then it has declined to below 12,000 acres.

Effect on Pastures

The effects on a pasture which has been used for the production of Montgomery red clover seed vary; damage may be slight or intense according to the amount of growth occurring in the seed crop. This top growth suppresses grass growth, and the general effect is the thinning out of ryegrass in particular.

After a very heavy seed crop some pasture plants are choked out and weeds, particularly Yorkshire fog, goosegrass, thistles, and docks invade the stand. This damage can be minimised by careful after-treatment of the stand; first, by removing excess threshed straw, and secondly, by removing roughage by means of cattle grazing, at the same time avoiding overgrazing by sheep during the initial recovery of the stand.

If the seeding of Montgomery red clover is put in its true perspective on the average mixed farm, it should be possible to take seed from surplus growth of Montgomery red clover-dominant pastures and still leave quite a good grazing sward.

The aim of the "small seeds industry", as it is frequently called, is not to grow pure stands of any one species, but first to establish a good, high-producing sward in which the species to be considered for seed harvesting is dominant.

In years of surplus growth this pasture can provide additional income from its seed crop and it should then take its place in the grazing economy of the farm unit. Too much damage to pastures has been caused by indiscriminate seeding of areas, often by seeding them too frequently, and this has resulted in unfair criticism of the practice of seeding and also in a high cost of renewal which could have been avoided.

Maintenance of Seed-producing Areas

The prospect of a seed stand's continuing to produce payable crops depends largely on the treatment given after harvest.

As second- and subsequent-harvest stands are particularly subject to attack by porina (*Oxycanus*) grub, all straw should be swept off the area as soon as the harvest is completed. Some chance of recovering leaf growth before winter should be given the plants, and recovery growth should not be grazed but should be saved until the plants are flourishing and some concentrated stocking becomes possible on the area. This is preferable to running a few sheep on the area and defoliating the plants as they are trying to recover from a seed crop. Hard winter grazing of seed stands is not recommended, as it will cause the main spring growth to be up to a month later in starting than on a winter-spelled area.

As the seeding of Montgomery red clover stands is a part of a mixed-farming rotation, and provided new stands are being laid down each year, it is not necessary to seed each stand more than twice, as the first 2 years' seed crops are the most remunerative. Stands which are seeded once or twice and then allowed to become grazing areas are quite satisfactory to both the seed and the grazing programme of the average mixed farm.

Pests

Red clover seed stands are not affected by many fungous or insect pests, though red clover thrips made themselves very apparent some years ago. Some damage to seed was caused by thrips in the clover seed heads, but it was not nearly as bad as the vast number of thrips to be found in a crop would suggest.

During wet years slugs cause damage to stems and crowns of red clover plants, but in dry years they are not found in great numbers.

Porina moth has caused widespread damage to stands, but if adequate precautions are taken in the removal of straw and the area is treated with DDT at 2lb. per acre (100 per cent. para para isomer equivalent) or commercial DDT superphosphate at the recommended rates is used, damage from this source should be minimised.

A. & P. Show Dates

THE following are dates and venues of A. and P. shows from mid-February to the end of April:—

NORTH ISLAND

February

14 and 15 February—Franklin A. and P. at Pukekohe.
*14 and 15 February—Ohura A., P., H., and I. at Niho Niho.
15 February—Waipu P. and I. at Ruatoria.
15 February—Pahiatua A. and P. at Pahiatua.
15 February—Northern Wairoa A. and P. at Mititai.
15 February—Opotiki A. and P. at Opotiki.
20 February—Matamata A. and P. at Matamata.
21 and 22 February—Masterton A. and P. at Masterton.
*21 and 22 February—Te Kuiti and District A. and P. at Te Kuiti.
22 February—Putaruru A. and P. at Putaruru.
22 February—Whakatane A. and P. at Whakatane.
26 February—Morrinsville A. and P. at Morrinsville.
*28 February and 1 March—Wellington and Hutt Valley A. and P. at Trentham.

March

1 March—Waiotira Junction A. and P. at Waiotira.
1 March—Mangonui County A. and P. at Kaitaia.
1 March—Albany A. and P. at Albany.
1 March—Te Puke A. and P. at Te Puke.
8 March—Kumeu A. and P. at Kumeu.
8 March—Tauranga A. and P. at Tauranga.
*15 March—Wellsford A. and P. at Wellsford.
15 March—Hawke's Bay A. and P. at Hastings.
22 March—Poverty Bay Autumn Carnival at Gisborne.

SOUTH ISLAND

February

15 February—Murchison A. and P. at Murchison.
15 February—Inangahua A. and P. and Sports at Reefton.
22 February—Maniototo A. and P. at Ranfurly.
*22 February—Kaikoura A. and P. at Kaikoura.

March

*1 March—Temuka and Geraldine A. and P. at Winchester.
8 March—Cheviot A. and P. at Cheviot.
*8 March—Mount Benger A. and P. at Roxburgh.
15 March—Hawarden A. and P. at Hawarden.
*15 March—Upper Clutha A. and P. at Wanaka.
22 March—Mayfield A. and P. at Mayfield.
*29 March—Methven A. and P. at Methven.

April

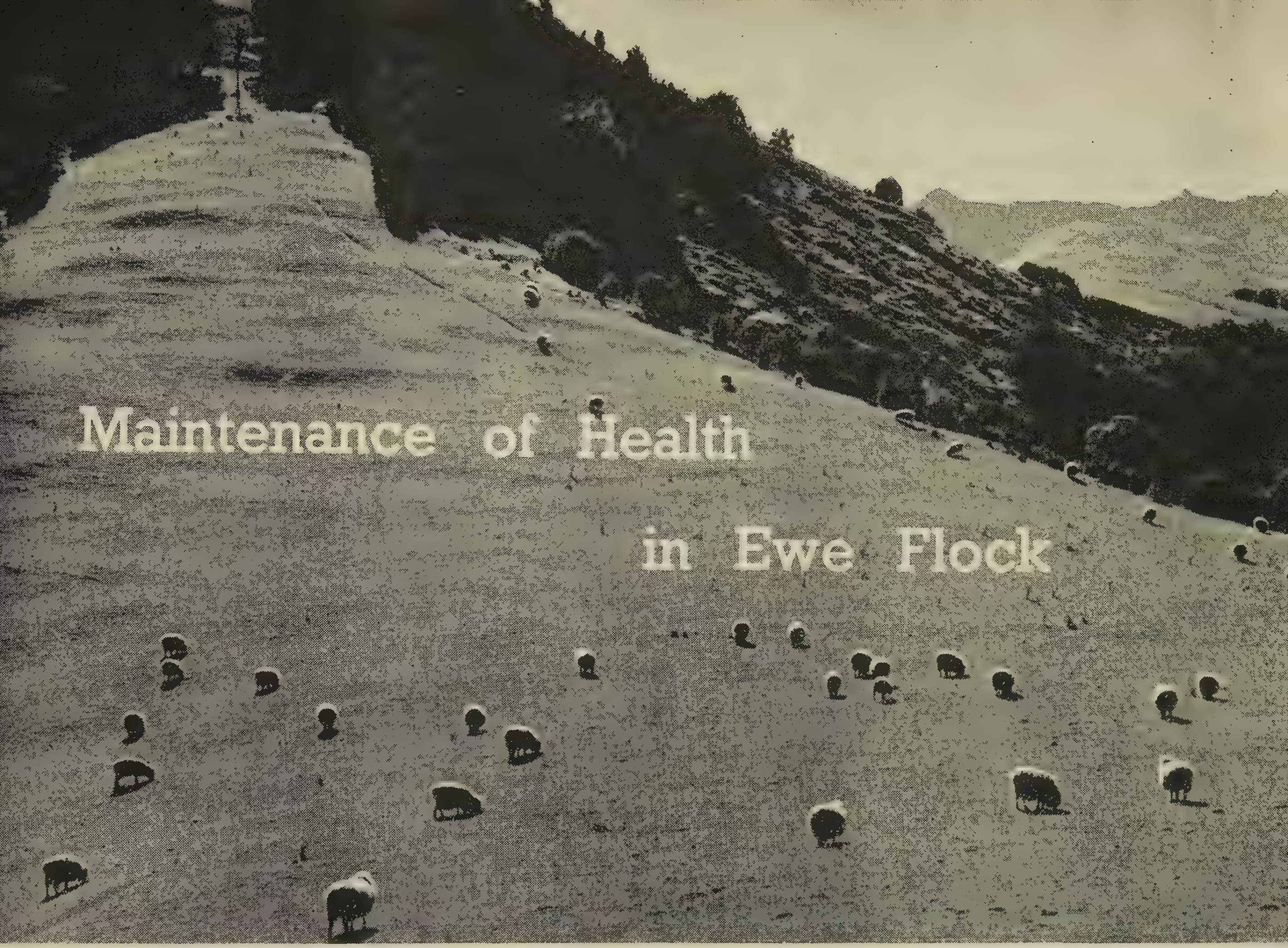
7 April—Strath Taieri A. and P. at Middlemarch.
7 April—Mackenzie County Highland Show at Fairlie.
12 April—Oxford A. and P. at Oxford.
*19 April—Malvern A. and P. at Sheffield.

* The Department of Agriculture exhibit will be staged at this show.

Ram Fairs

The following are dates and venues of ram fairs from mid-February:—

13 and 14 February—Canterbury flock at Addington.
14 February—Dannevirke at Dannevirke.
14 February—Ohura at Niho Niho.
5 March—South Otago at Balclutha.



Maintenance of Health in Ewe Flock

[V. C. Browne

UNTIL recent years sheep farming in New Zealand has been run on an extensive basis. Under such conditions maintaining the health of the ewe flock has been relatively easy, and because stock values have been low, losses have been of little economic importance. Today the breeding ewe is worth a lot more than she used to be. It pays to keep her healthy. All farming costs are up. To meet this developing situation farming has become more intensified. Intensified farming demands a much higher degree of managerial skill. This is especially so where larger numbers of sheep have to be carried on the same area. This article dealing with maintenance of health in the ewe flock is adapted from a paper given by J. C. Gerring, Animal Research Extension Officer, Department of Agriculture Animal Research Station, Ruakura, at the 1957 Ruakura Farmers' Conference Week.

MAINTENANCE of health means far more than merely reducing the number of deaths. It means that ewes must be managed so that disease or lack of thrift is not a limiting factor to high productive performance. To achieve this aim management of the ewe flock must be carefully planned, particularly during winter, so as to relate the level of feeding more closely to the animals' requirements.

Faults in management known to precipitate outbreaks of disease must be avoided. When losses occur veterinary advice must be sought more promptly to establish a correct diagnosis. Full use must be made of preventive and treatment measures to combat specific infectious and nutritional diseases, and the modern concept of hygiene must become an accepted practice on all intensively managed sheep farms.

Diseases Associated with Management

A recent survey made by the Meat and Wool Boards' Economic Service shows that 80 per cent. of ewe losses occur about the lambing period. This fact highlights the importance of winter management of the ewe flock to maintain health.

Observations made by the Rukuhia Soil Research Station over seven consecutive seasons on good winter growing country have shown that in an average season the amount of grass grown in April and May exceeds by more than 50 per cent. that produced during June, July, and August.

In contrast, work at Ruakura on the feed requirements of breeding ewes proves that the flock can be held on a bare maintenance ration during the first 2 to 3 months of pregnancy, that is, during the whole of April, May, and most of June, without endangering health or productivity. This is because the developing lamb is so small at this stage that the extra requirement for pregnancy is negligible. This same work emphasises the importance of gradually lifting the level of feeding during the last 5 to 6 weeks before lambing. It is during this period that almost 80 per cent. of the lamb's development takes place. At this time, too, a fall in the plane of nutrition is liable to cause an outbreak of sleepy sickness.

Quite apart from pregnancy the amount of feed required to maintain an animal's condition is directly related to its liveweight. The heavier the animal is the more feed it requires. If a ewe weighing 120lb. is allowed to

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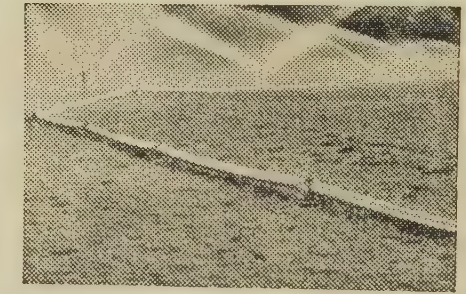

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put on an additional 20lb. liveweight during the late autumn, she will need about 12 per cent. more feed in winter just to maintain her increased liveweight of 140lb.

To overcome this situation and relate the feed supply more closely to the flock's requirements it is important to hold ewes on a bare maintenance ration during late autumn and carry forward the feed saved for use during winter.

Since in all flocks there are a proportion of older and thinner ewes, these should be drafted off from the main mob periodically during this maintenance feeding period and quickly rotated round the spelled portion of the farm. In the same way cattle can be used judiciously to prevent the feed on this area getting out of control.

In using this saved feed to the best advantage it is important, too, to plan well ahead, assessing periodically the amount of feed available in relation to the flock's future requirements and adjusting the rate at which this feed is used accordingly. If this type of management was more widely practised, there would be a negligible amount of sleepy sickness.

[*Campbell*

Carcasses of ewes which die must be disposed of promptly by burning or burying to a depth of at least 3ft.

Milk Fever and Transit Tetany

Outbreaks of milk fever are frequently associated with the yarding of ewes just before lambing, for crutching or some other purpose, and leaving them in the yards overnight. The obvious remedy is to yard ewes in small mobs and get them back to their paddocks with as little delay as possible. The droving of in-lamb or lactating ewes may also precipitate cases of milk fever. Another predisposing cause is a sudden change to lush feed. All these causes are avoidable by better management.

Transit tetany is a disease very similar to milk fever and, as its name implies, is associated with the transit of sheep over long distances either by rail or road without access to food over several days. To prevent this disease the sheep should be untrucked en route where several days are taken on a journey and given access to food and water.

Bearing trouble is a disease the cause of which is being intensively investigated at Ruakura. At Ruakura Hill Station a small flock of ewes all with a previous history of being affected has been collected. The disease has recurred in 60 per cent. of those ewes during the following season. Affected ewes, therefore, should obviously be marked for culling.

In a mixed aged experimental flock which have been bred from bearing ewes by rams out of bearing ewes no cases of bearing trouble have so far occurred. The disease is, therefore, not strongly inherited. Field evidence suggests that many cases are precipitated by giving ewes sudden access to long feed.

Pre-lambing Shearing Precautions

The shearing of ewes before lambing is now quite a common practice. Its advantages are a reduction in cast ewes, an increased tendency for them to seek shelter at lambing time, and less hazards from ewes getting bogged in wet places or hung up in blackberry. Precautions necessary with pre-lambing shearing are to cease shearing each day in time for the ewes to get a good feed before nightfall and to put them in well-sheltered paddocks for the first few days.

Any sudden and severe check in the level of feeding can lower the resistance of even fat ewes and precipitate an outbreak of diseases such as haemonchosis (the large stomach or barber's pole worm) and salmonellosis. Such checks may be brought about by holding recently weaned ewes in a bare paddock or in yards too long during shearing or dipping or at sales. Similar checks may occur when ewes are moved long distances, either on foot or transported, without access to food. The overcrowding of ewes associated with these checks frequently increases the rate at which such diseases spread through the flock, often resulting in serious losses. Pink eye, too, is a disease the spread of which is favoured by overcrowding.

It is significant that the incidence of salmonellosis is highest during January, when the weaning, dipping, and transport of ewes most commonly take place.

It has always been recognised that these are the sorts of disease hazards which are sometimes associated with the type of management advocated for facial eczema control.

Ryegrass Staggers

Ryegrass staggers is a disease which can be troublesome in some seasons, particularly after a dry summer. It occurs most commonly on dried-up ryegrass-dominant pastures or soon after rain when growth is just beginning. It has also been reported on longer, green pasture such as hay aftermath. Both perennial and short-rotation ryegrass have caused outbreaks.

Symptoms vary widely in severity from slight stiffness of the limbs in sheep when driven to complete inability to stand or to make any sudden movement without falling. The commonest form is that in which the animals show no abnormality until driven or disturbed, when they show a characteristic stiff, bounding action for a few paces and then fall.

Mildly affected animals seldom lose condition or die, except from accidents such as blundering into drains and drowning. Even severely affected ones rarely die; when they do it is probably from starvation.

There is no reliable treatment. Most cases recover spontaneously within a few days to 2 or 3 weeks whether a change of feed is given or not. In the meantime affected sheep should be kept in paddocks free from hazards. In districts where the trouble is extensive the provision of some pastures containing little ryegrass is an obvious way out. Such pastures would be used during the susceptible period.

Other preventive measures available are to provide hay, silage, or crops as reserves in drought periods.

In spite of the introduction of dipping materials which have proved to be extremely effective when used under expert supervision, lice and keds still persist in many flocks. Heavy infestations of these parasites have a serious effect on the health of sheep. Their numbers reach a maximum during winter and add materially to the difficulties of management at this time of the year.

With the materials available today these parasites could be eradicated if every farmer made a thorough job of dipping. This means using dips at the correct strength, maintaining this strength from start to finish, thoroughly saturating each sheep, and dipping all sheep on the farm as near to the same time as possible.

With the recent introduction of new insecticides, fly strike control has been made much easier than before. However, fly crutching of ewes when required, particularly in wet seasons, is still an important preventive measure.

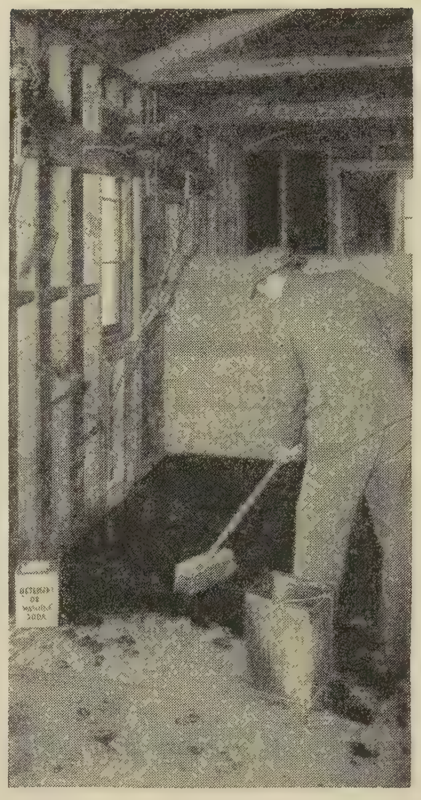
Diseases not Necessarily Associated with Management

Blackleg or blood poisoning is a major cause of deaths in ewes. Though losses do occur without any obvious predisposing cause, most are associated with the contamination of wounds at lambing, shearing, or dipping. Since the vast majority of cases are found dead and where symptoms are seen death nearly always supervenes within a few hours, there is no practicable treatment for this disease.

Ewes which have been assisted to lamb, have been treated for bearing trouble, or have been wounded in any other way, such as being bitten by a dog, can be protected from blood poisoning by a single injection of 500,000 units of penicillin, provided this is given immediately before symptoms have developed. This, however, is only an emergency measure.

Fortunately, a very effective vaccine against this disease is available which gives a much more comprehensive cover for, in the long run, a lower premium. Under most conditions, one injection will protect a ewe for the rest of her life. If given 3 weeks before lambing, it will also protect her lamb up to 6 weeks of age.

Abortions in ewes have become increasingly prevalent in recent years. The use on rams of the double vaccine developed by Wallaceville Animal Research Station [see the August issue of the "Journal", page 117] and now available commercially should reduce substantially the amount of brucellosis infection in ewes.



Woolsheds may become heavily contaminated with disease organisms unless they are cleaned regularly and thoroughly.

Vibrio foetus infection is another cause of abortion and one which was widespread in flocks in the Waikato in 1956. Fortunately in most cases the percentage of ewes affected in any one flock was low.

There are still many gaps in knowledge of this disease. Experimentally it has been produced by dosing ewes with cultures of *Vibrio foetus* organisms. On these grounds it is considered that ewes become infected by mouth from contaminated food and/or water.

Both field and experimental findings indicate that the ram is not the source of ewe infection. From field experience the disease appears to be a self-limiting one. Infected ewes clear up spontaneously and do not abort again. It is therefore not necessary to cull them. On general grounds the immediate isolation of ewes which have aborted, the prompt disposal of aborted lambs, and the disinfection of immediate surroundings would be wise precautions in helping to reduce the chances of infection to the remainder of the flock.

Odd cases of gangrenous mastitis ("blue bag" or "black udder") are common and usually result in the death of affected ewes within 12 to 72 hours. Cases can occur at any time from about 3 weeks after lambing up to a week before weaning. The disease is often associated with injuries to the skin of the teats or udder.

Cases are seldom found until the disease is well advanced, by which time the affected quarter is permanently destroyed. Amputation of the teat to provide drainage and dosing the ewe with penicillin or sulphamezathine may save her life, but she should be marked for culling.

Foot-rot is a specific infectious disease which can be prevented by special management methods. A district eradication scheme operated at Purua, Northland, has been described in articles in the March and June 1957 issues of the "Journal".

Hygiene

Hygiene is an essential measure in maintaining health in the ewe flock. Some of the more important diseases mentioned are associated with the yarding, shearing, and dipping of sheep. Surroundings of these operations must inevitably become heavily contaminated.

Regular cleaning of the woolshed, both above and below the gratings, removal of dust and dirt from the shearing plant, disinfection of the handpieces, frequent scrubbing and disinfection of the shearing board, keeping the pens and yards clean, and periodic spelling of the holding paddocks will pay handsomely.

Dips should be thoroughly cleaned out before dipping and kept clean, as far as is practicable, during dipping. Prompt treatment of shearing cuts and other wounds is also important.

Losses sometimes occur after the vaccination of ewes against diseases such as blackleg, pulpy kidney, and tetanus. These can be avoided by taking a few rudimentary precautions: Vaccinate the sheep in temporary yards set up in a paddock which has been spelled for a few weeks; sterilise syringes, needles, and other equipment by boiling for 10 minutes; keep all spare needles immersed in methylated spirit and change the needle frequently during vaccination; protect the vaccine from contamination by dust. Never vaccinate sheep which are wet.

Isolation of sick ewes and the prompt disposal of carcasses by burning or burying at least 3ft. deep will lessen the risk of infection and reduce contamination of the surroundings. Cleanliness at lambing time and in the treatment of bearing cases is essential.

Today most sheep farmers have ready access to an efficient veterinary service both in the field and in the diagnostic laboratory. With the aid of this service the cause of most losses can be diagnosed accurately. Usually effective preventive measures are known. What is even more important is that sound advice can be obtained in the paddock on how to maintain health.

The Home Garden in March

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

THERE is usually comparatively little sowing or planting to be done in the home garden in March because the main winter crops, such as savoy cabbage, kale, broccoli or winter cauliflower, silver beet, leeks, and root crops, such as carrots, parsnips, and beetroot, are well established. Routine work includes weed control, the sowing or planting of a few crops to mature or to become established before winter, composting, watering, or giving liquid manure where necessary, and digging over and sowing vacant land with green crops.

EARLIER-SOWN crops, such as lettuce, spinach, and silver beet can be thinned, or seedlings can be planted out. Any crops infested with aphids should be sprayed with nicotine sulphate or lindane. If red spider mite is troublesome, it can be controlled by spraying with one of the certified miticides now on the market. Most relatively active creatures, such as caterpillars, green vegetable bugs, vegetable weevils and their larvae, can be controlled by DDT dusts or sprays.

Celery should be sprayed against leaf spot. Where potato blight is likely to be troublesome, potatoes and tomatoes should be sprayed with a copper spray or other certified material.

Compost

The compost heap can be built up with garden rubbish. Care should be taken to burn crop refuse infested with insect pests or infected with disease. Certain fungi produce hard, black resting bodies, known as sclerotia, which enable the fungous diseases to persist for long periods in the soil. It is important that these resting bodies should not be allowed to fall to the ground or to be included in a compost heap.

Onions and shallots should be harvested in March, if this work has not yet been done, and the properly cured bulbs stored in a dry, airy place. The pods of peas and beans should be gathered before they are fully mature to encourage plants to continue bearing. Vegetables intended for winter and spring use, such as cauliflower, broccoli, kale, leeks, savoy cabbage, and silver beet, should be kept cultivated and, where necessary, fed with liquid manure or given side dressings of fertiliser to ensure that good growth is maintained.

Celery should be blanched as it reaches maturity or just before. If the work is started early, sections of the crop can be blanched progressively, so that the heads will be in their best condition for a considerable period as they are needed. Toward the end of the month, in districts where winters are not too severe, a sowing can be made of carrots and onions for spring use.

Spinach can still be sown for late autumn or winter use in most gardens, and cabbages, silver beet, and, in reasonably favourable situations, cauliflowers can be set out. In specially favoured districts where soil conditions are good, particularly in the north, sowings can be made of crops such as beetroot, turnips, silver beet, and radishes.

Carrots

Carrots are one of the most important and popular vegetables because of their nutritional value, flavour, and long period of availability, but many home gardeners have difficulty in growing satisfactory crops from late spring and summer sowings.

Apart from the need for a well-cultivated, highly fertile soil, one reason for lack of success is that seed does not germinate, nor do young seedlings grow well when soil conditions are very hot and dry. The roots of established plants stand fairly high

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[*Sparrow*

Hoeing is one of the most effective means of keeping down weeds, especially when conditions are hot and dry. The hoe should be kept sharp.

temperatures, possibly in part because they are in the relatively cooler undersoil, but growth is usually better when temperatures are not too high.

In districts where winter temperatures are not too low home gardeners desiring early spring carrots should make a sowing about the end of March. Where drainage is poor a raised bed is advisable and for convenience in cultivating and harvesting the bed should not be more than 3ft. wide. Soil heavily manured for the previous crop is best and sandy or light loams are especially suitable for autumn crops.

Soil Conditions

Soil should be of good texture and should not bake or form a crust after rain, or emergence and growth may be adversely affected. Heavy soils on which growth is comparatively slow tend to produce thick, short carrots with greater core development and poorer table quality than do lighter, more free-working soils.

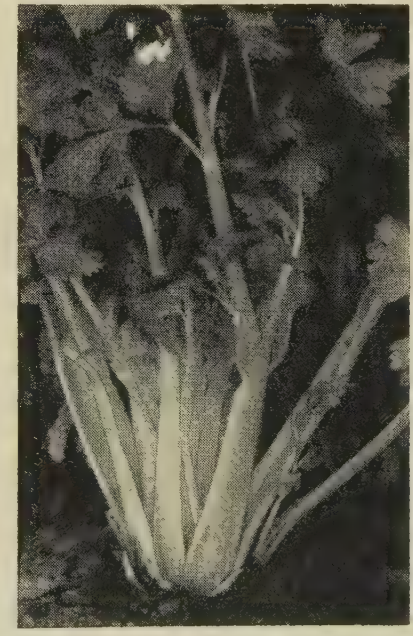
Trials with some popular varieties, Chantenay for instance, have shown that roots which are accepted as most typical of the variety are produced when the temperature during growth is about 65 degrees F. At 10 degrees lower they are longer and thinner and at 10 degrees higher they are shorter and thicker.

Carrots vary in shape, colour, and size according to variety, but all these characteristics may be influenced by soil conditions. Soil influences size more than it does shape. Colour, too, varies considerably. The colour most desired by the housewife is usually red or orange-red and is a result of an accumulation of a substance called carotene.

Irregular moisture supply and high temperature bring about the development of a rough surface on the carrot. Horizontal depressions, which may be quite deep, occur on the root and make it wasteful in preparation for the table.

Sowing

Carrot seed should be sown thinly ¼in. to ¾in. deep, according to whether the soil is heavy or light, in rows about 12in. apart. If the soil is light and free, there should be no need to thin young plants, but on heavier soils they can be thinned to about 2in. apart. Thinning should be done preferably when the soil is moist so that the remaining seedlings are disturbed as little as possible. If thinning is delayed, the thinnings can be used for soups and stews. An eighth to a quarter of an ounce of seed should sow about 100ft. of row.



[*Green and Hahn*

To attain best quality, celery needs to be kept growing strongly during autumn and should never be short of moisture.

Carrot seedlings are delicate and cannot compete with weeds or withstand drying out which may result from baking or cracking of the soil. Cultivation should therefore begin as soon as the rows can be distinguished. A little radish seed, which germinates quickly, is sometimes sown with some of the carrot seed to give an early indication of the position of the carrot rows.

Good varieties include Chantenay, Taranaki Strong Top, Nantes, and Morse Bunching. Scarlet Horn is widely used where a quick-maturing carrot is wanted.

Celery

Early celery should now be ready for harvesting. As some of the quick-maturing varieties that are usually grown for early use tend to become overripe and pithy and lose weight and flavour if held too long, the plants should be watched for signs of near or full maturity and harvested and used then.

Celery is usually harvested by removing the blanching paper or boards and then driving a sharp spade or cutter under the bases of the plants to be removed. The plants can then be lifted, the remaining roots trimmed off with a sharp knife, and any damaged outer leaves stripped off.

The quality of celery, like that of most other vegetables, falls off progressively the longer it is kept after harvesting. Falling off in quality is less important if celery is to be used in soups or stews than if it is to be used for salads. Good produce may be stored up to 2 to 3 weeks at cool to near freezing temperatures and though some of the inferior types of celery which are often grown for early use are best used (if for salads) immediately after harvesting, all varieties of

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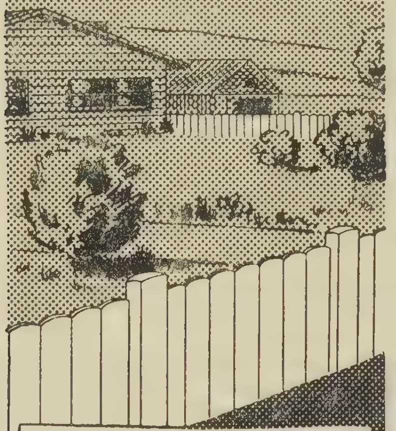

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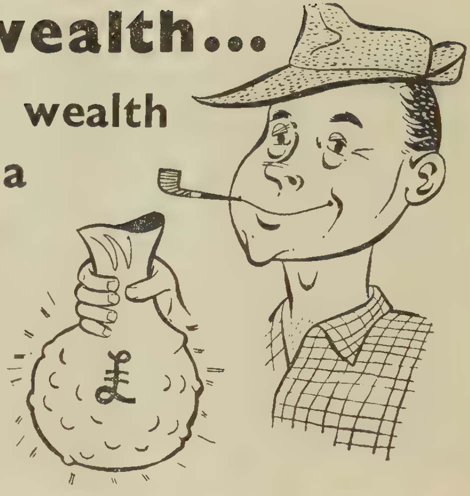

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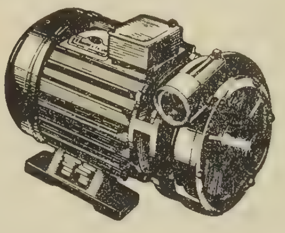

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[*Green and Hahn*

The drying and curing of mature onions should be completed while the weather remains favourable.

celery, whether early or late, can be stored in a refrigerator or in a trench if it is in a sufficiently cool, shady part of the garden.

Where celery is stored in a trench ventilation must be good or rots are likely to develop. The plants should be stood upright so that the bases, either partially or cleanly trimmed, rest in the cooler, moist soil at the bottom. The trench can be covered with two fairly wide planks set to form a ridge to turn rain and provide shade.

Though celery does not tolerate low temperatures in the early stages of its growth—low temperatures may cause premature seed stalk development—when past the seedling stage and well established it thrives if the weather is relatively cool.

Liquid Manure

As celery is a moisture-loving plant and as its fertiliser needs are high, liquid manure is usually helpful where conditions tend to be dry and soil fertility is low. Blanching of the main crop is usually begun in most home gardens in March, early or late in the month according to growth of the crop, variety, and district. Most self-blanching varieties can be blanched in from about 10 to 21 days, but with the non-self-blanching varieties blanching may take about 14 to 40 days, according to variety, temperature, the extent of blanching desired, and whether it is done in stages.

Self-blanching celery is usually blanched by placing 10in. or 12in. by 1in. boards held in place by pegs round the sides of the beds. Stiffened paper can be used if desired in place of the boards.

The non-self-blanching type of celery can be blanched similarly, but as a much longer period is needed for blanching, plants are usually either wrapped individually in stout paper held with string or elastic bands or earthed up in fine weather with clean, free-working, reasonably dry soil. Preferably this should not contain much organic matter likely to cause rots and be free from the eggs of slugs or similar harmful creatures. Small or decaying outer stems should be removed before earthing up is done.

Earthing up is the most difficult way of blanching. The earth when banked up should be ridged sharply and the soil surface beaten smooth with a spade to shed rain. Under wet conditions rots may develop if soil remains touching the inner stalks after earthing up; stems should therefore be drawn together with the soil packed round them.

Blanching with clean, odourless paper is quite satisfactory. A long strip of strong paper can be placed along the sides of the bed and held in position with heavy, arched wires. Blanching tends to check growth and therefore should not be begun until the plants are well on toward maturity. If, however, a good head of leaves is left at the top and soil is used for blanching and is not too tightly packed, plants should continue growing.

Self-blanching varieties contain very little chlorophyll in their leaf stems and can be blanched very simply and quickly with paper or boards.

Home gardeners who have a large planting of one variety of celery and who intend to harvest it over a long period can begin blanching when the plants are about two-thirds grown.

In the U.S.A. green celery has largely displaced white celery and many new varieties of excellent quality have been bred to suit particular conditions in that country.

Celery Leaf Spot

Celery leaf spot is the most serious disease of celery and often injures foliage severely and blemishes the outer leaf stalks. It may be seed borne and often infection starts from the seed. Leaf spot may be caused by one or other of two closely related fungi which give rise to somewhat different though superficially similar symptoms.

When fine, dry weather prevails after planting the spread of the disease may be slow, but if a spell of wet weather intervenes or overhead irrigation is resorted to, the spread may be rapid. Damage is usually worse when the weather allows plants to grow only slowly while the fungus can develop quickly.

These conditions occur usually during dry weather when there is not enough soil moisture for good plant growth but there are cool, dewy nights followed by dull days. Plants may be moist for the greater part of the day and this enables the fungus to develop so rapidly that the plants are unable to overcome the attack, as they grow very slowly.

Control consists of spraying with bordeaux mixture or copper oxychloride or one of the newer certified therapeutants, such as captan or zineb, which usually give effective control without causing damage as bordeaux sometimes does.

Onions

Harvesting and curing of onions for long keeping should be completed as soon as possible as advised in last month's notes. After March the

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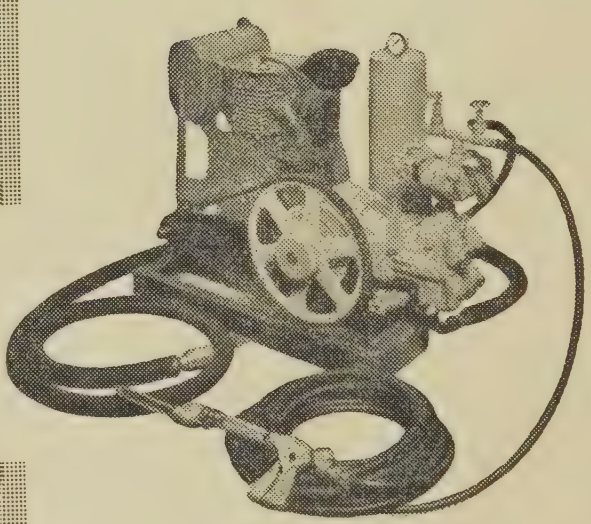

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[*Green and Hahn*

Runner beans should be picked before the pods are mature to prevent the seed from ripening and to induce plants to produce over as long a period as possible.

weather in most districts becomes progressively less favourable for drying and curing the bulbs. Only sound, well-formed bulbs which have been properly cured should go into long storage; others should be put aside for immediate use.

Small quantities can be strung or stored in open-mesh bags in a cool, ventilated shed or cellar. However, because of the injury which often results when there is a heavy weight of onions in a bag it is advisable when storing considerable quantities of onions to use specially made, slatted storage crates or to store them on slatted shelves. Onions should not be exposed to direct sunlight during storage, as it may promote early growth.

If onions have to be stored outside, a dry, sunless position where there is good air draught is desirable. The onions should be covered against rain and preferably placed on a structure far enough above ground to enable air to circulate under them.

Autumn Sowing

Though autumn sowing of main-crop onions is a fairly general practice in the North Island, it is rarely done in southern districts. In most districts late March or early April is considered the best time for autumn sowing.

In southern districts the onions are not usually thinned, but are kept cultivated and grown on until about November or December, when they are used as "thick necks" without being encouraged to form large bulbs. In most northern districts, however, the plants are lifted in early spring and set out in rows 12in. to 15in. apart with the plants 4in. to 6in. apart in the rows.

Autumn sowing in some districts is rather risky, and where winters are severe success depends to some extent on the season. Early frost will sometimes "lift" and damage late-sown crops, whereas if the seed is sown too early or if a long period of mild weather precedes a very severe cold period, the plants sometimes run to seed before they have developed adequately.

Though this is true of autumn sowing in general, in the north, where winters are less severe and mildew is more troublesome on the later-maturing crops, the risks are much less and autumn sowing and subsequent transplanting of the main crop are quite common. For autumn sowing the ground should be deeply cultivated and broken down to a fine tilth. It should be gently firmed, but care should be taken where the soil is heavy to avoid firming it too much, as the heavier soils tend to consolidate excessively where they are subjected to frequent winter rains.

If well-rotted stable or farmyard manure is available, it should be incorporated some time before the final preparation of the soil is begun. Best use can be made of such manure by adding to it about a thirtieth of its weight of superphosphate and applying it to land on which the crop is to mature. If good-keeping onions are required, it is not advisable to apply excessive quantities of organic manure in spring, as the bulbs may be stimulated into excessive leaf growth and weed growth is liable to be more troublesome.

Few home gardeners are likely to have much farmyard manure, and available organic matter such as compost plus a complete fertiliser applied at the rate of about 3oz. to 6oz. per square yard should be used. Because of the great variation in soils and their condition throughout New Zealand only local experience and knowledge can indicate fertiliser requirements.

In general a fertiliser high in phosphoric acid but containing a liberal amount of potash and a smaller amount of slowly available nitrogen will give excellent results. The phosphoric acid and most of the nitrogen for early planted crops can be supplied conveniently by finely ground bone meal and the potash by muriate or sulphate of potash.

The practice of growing onions on the same land for several years in succession has something to commend it, though it probably arose from a recognition of the high fertiliser needs of onions and consequently the desirability of maintaining very high fertility in an area of the garden regarded as the onion bed. Some trials indicate that onions are likely to do best following cereals, clovers, or grasses, though they are likely to do better following onions than after most other kinds of vegetables.

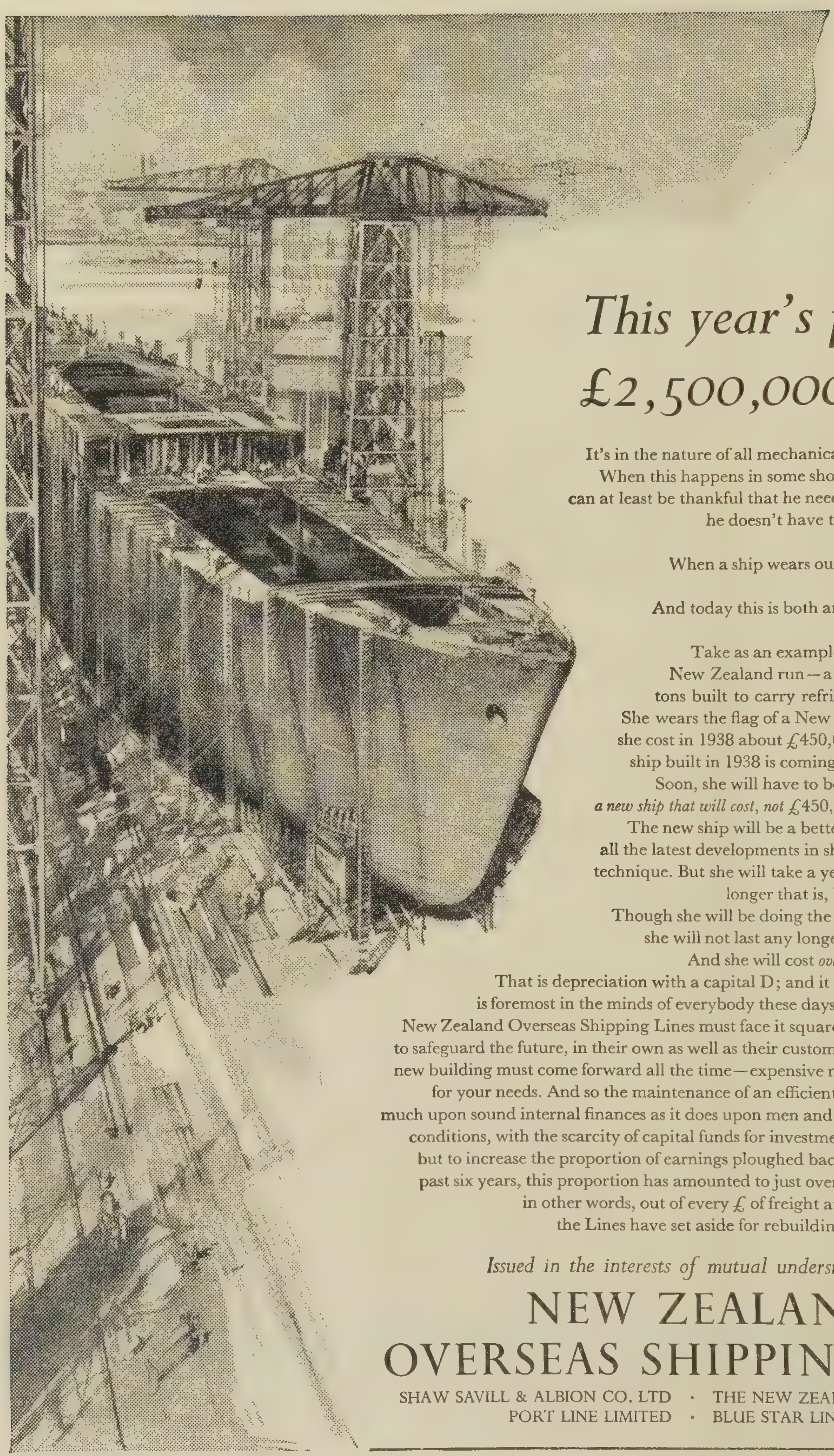
However, where disease is troublesome rotation is just as important in growing onions as in growing other crops, as root and bulb diseases to which the crop is specially subject tend to build up in soil unless crops are rotated. In addition, most other vegetables grow well without further fertiliser on land that has received the heavy fertiliser applications usually given to onions.

Onion seed should be sown ½in. deep at 10 to 20 seeds per running foot in rows 12in. apart in finely cultivated soil.

The growth of onions, unlike that of most other crops, is not usually seriously affected by moderate crowding in the rows. Provided the seed is not sown too thickly thinning should not be necessary on most soils. Good varieties of onions are Ailsa Craig, Straw Spanish (early), and Pukekohe Long Keeper (main crop).

Parsley

If an autumn sowing of parsley has not yet been made, seed can be sown now. Parsley is hardy and will stand the winter without harm anywhere in New Zealand. It is a biennial; that is, it goes to seed the second year. Parsley is usually rather slow to germinate and grow, but it responds well to good soil and to an abundance of nitrogen. Blood and bone at 2oz. to 3oz. to the square yard is a satisfactory fertiliser on most soils.



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In most districts seed should be sown early enough to enable the young plants to become well established before the advent of cold weather. Provision is often made for slow germination by sowing a month or even 6 weeks earlier than would otherwise be necessary, but in well-drained, moist soil germination is usually not greatly delayed. Seed sown now is intended in most districts to provide supplies for next spring and summer, because in the well-planned garden parsley will be sown twice a year, in spring and autumn.

Seed can be sown in rows or broadcast on a small plot, but for the best results the plants should be set out about 1ft. apart when at the seedling stage. They make quite a good edging and do well in a cool, moist soil in the open or in semi-shade. Aphids are occasionally troublesome, but are readily controlled by spraying with nicotine sulphate 1 : 800 (½ fl. oz. plus 1oz. of soap to 2 gallons of water) or lindane.

Potatoes

Potato crops that are still growing should be kept weed free, but deep hoeing should be avoided, as the roots may be damaged.

Potatoes are mature when the skin of the tuber is firm and does not rub off easily, but while top growth is healthy and vigorous tuber development will continue. The tops therefore give the first indication of crop maturity and should be watched closely, as there is rarely any advantage in leaving the crop undug once maturity has been reached. During wet warm weather, second growth may occur and the tubers may develop knobbly outgrowths, or small, useless tubers may grow at the expense of the large ones. Insect damage is also common.

In the north particularly the potato tuber moth may lay eggs on tubers not properly moulded. Slug damage is not uncommon in New Zealand, particularly when the autumn is wet; millepedes and wireworms too are occasionally troublesome. Loss from insect damage may therefore be considerable. Growing tubers that are attacked by insects occasionally endeavour to grow round the point of attack or source of irritation and the knobbly outgrowths produced (not unlike those resulting from second growth) make such tubers very wasteful in preparation for the table.

In districts where crops are likely to be attacked by late blight they should be sprayed with bordeaux or copper oxychloride or zineb unless digging is to be begun without delay. If potatoes for keeping for several months are dug when immature, there is likely to be heavy loss in storage.

[*Sparrow*

Potato crops that are still growing should be kept moulded up.

Spinach

Though spinach is usually one of the first subjects for early spring sowing, it is also a useful vegetable for late autumn sowing. It withstands frost or freezing conditions and it can be sown throughout winter in most districts in well-cultivated soil that is not heavy, provided the seedlings get established.

Spinach is generally rated highly as a health-giving vegetable and is quick growing, maturing under favourable conditions in from about 40 to 55 days. It will grow at temperatures only slightly above freezing, though the optimum growth temperature is somewhat higher. Though seed germinates at relatively low temperatures, seedling emergence is usually delayed where there is frequent heavy rain.

Spinach is usually classified according to whether the seed is round or prickly and most seedsmen still sell spinach mainly as either prickly seeded or round seeded, though it is preferable to buy named varieties, irrespective of seed type, suited to specific purposes.

Prickly seeded spinach is usually sold for winter use, as it is generally considered hardier and more long standing than round seeded. This belief in the superiority of prickly seeded spinach is not supported by the evidence of trials of different varieties of the two kinds. It has been clearly demonstrated that there are long- and short-standing varieties of both round and prickly seeded spinach. Either may be smooth or savoy (crumpled) leafed.

The habit of bolting to seed, which is an inherent factor present to a greater or less degree in all varieties of spinach, is encouraged by long days and high temperatures. For this reason summer sowing of even the relatively long-standing varieties is not advisable in certain districts. Even the most heat-tolerant varieties will not germinate and grow well in hot, dry weather.

When excessively high temperatures are maintained for some time the edges of the leaves, particularly of the older ones, turn yellow. Continuing high temperatures result in the whole leaf turning yellow and the plant is then likely to die of rot or collar disease.

Soil Conditions

Spinach thrives in cool conditions and in a great range of moist, rich, well-cultivated, and well-drained soils. It is not tolerant of high soil acidity and lime should be applied to most soils that have not been dressed recently, though too much may cause yellowing because of a deficiency or unbalance of certain essential elements such as manganese or iron.

A good dressing of organic material such as well-rotted farmyard manure or compost supplemented by a complete fertiliser at 1½oz. to 3oz. per square yard is advisable on many gardens. As spinach is a leafy vegetable, extra nitrogen may be supplied by liquid manure or a side dressing of nitrate of soda or sulphate of ammonia raked in along the line of row. Liquid manure is preferable where conditions are inclined to be dry, as abundant

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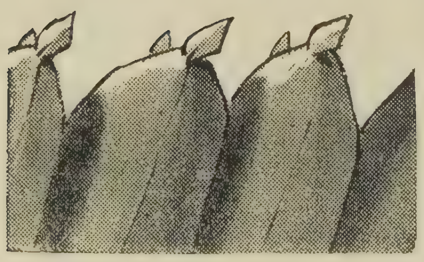

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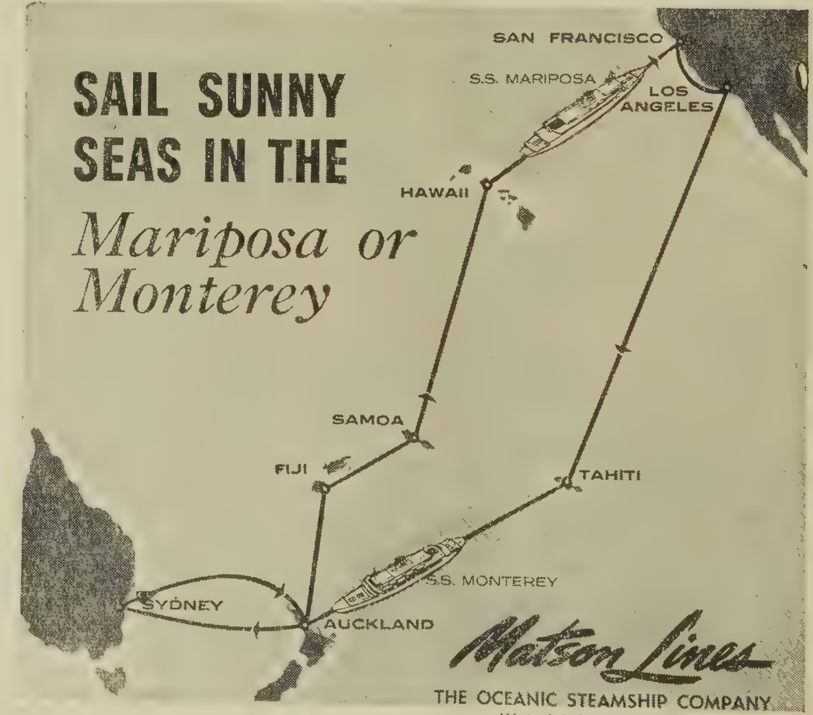

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moisture is essential for high yields and good quality; growth should be reasonably quick, as otherwise some varieties tend to be tough.

Seed should be sown thinly ½in. to 1in. deep in rows 12in. apart. Plants can be thinned to 4in. to 5in. apart in the row, though if seed is sown thinly, very little thinning may be necessary.

The virus disease mosaic sometimes causes reduction in yield. The first symptoms appear on the youngest leaves as numerous, fairly large, golden yellow flecks accompanied by crinkling. In a few days yellowing becomes general over the leaf. Older leaves wither at the tips, become yellow, and die. In a few weeks the plant is reduced to a small, stunted rosette of much-crinkled leaves. Infected plants should be removed and burnt.

Aphids are probably the most active agents in spreading mosaic, which may be carried over from one season to the next in plants of crops such as silver beet, spinach, and beetroot. Aphids should be controlled by regular spraying with nicotine sulphate or lindane.

Winter Greens

Winter greens such as savoy cabbage, cauliflower, or broccoli, fine-leaved kale, and leeks should be kept growing strongly.

Pests such as caterpillars should be controlled by spraying with DDT, DDD, or lindane. Aphids and thrips can be controlled by using nicotine or lindane sprays. If conditions are dry, the plants should be watered. On poorer soils liquid manure made from animal manure or sulphate of ammonia at 1oz. to about 2 gallons of water should give improved growth. Alternatively, the soil can be top-dressed with sulphate of ammonia at about 1oz. to the square yard.

Brussels sprouts should be harvested regularly as they reach full size. The bottom sprouts should be gathered first. Leaves should be removed from the base as they turn yellow. Plants in exposed situations may have to be staked, as they usually tend to become top-heavy with leaves and sprouts as harvesting progresses.

Various diseases which cause spotting or blotching of the leaves commonly develop on members of the cabbage family toward the end of March. If only a few outer leaves are affected, the trouble may be checked by their removal. Where infection is more advanced protective copper or other fungicidal sprays may be advisable, though most of the diseases which cause forms of leaf spot increase mainly during the cool and moist conditions that occur in late autumn or winter.

Water Hyacinth Reproduces by Seed in New Zealand

By J. G. MANSON and B. E. MANSON,
Department of Agriculture, Palmerston North

FROM 1948, when the potential danger of water hyacinth was recognised, until 1955 its eradication was largely unsuccessful. This may be attributed partly to the fact that it was not realised that it can and does set viable seed in this country. The fact that it is setting seed has increased both the difficulty of its eradication and its potential danger, particularly in streams, where the seeding plants can be distributed by the running water.

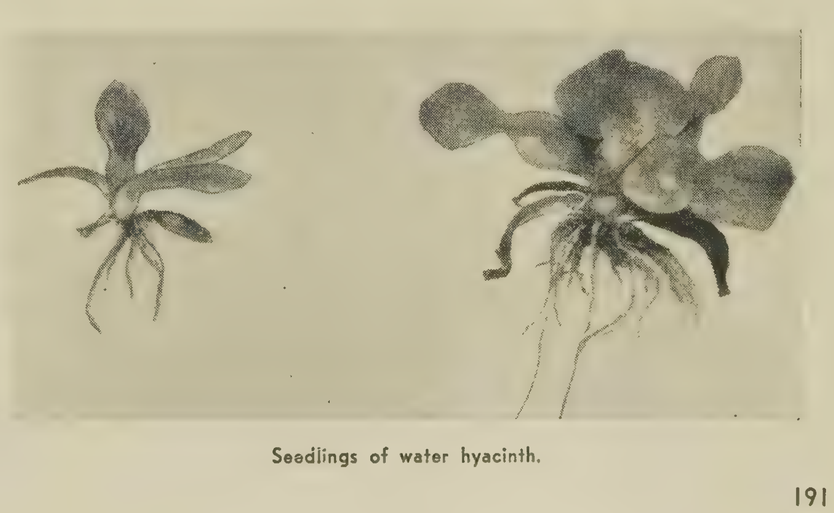
SINCE late in 1955, when a concentrated plan of eradication was initiated, the areas where viable seed has been set have been clearly defined. Of the 45 areas in which water hyacinth is known to be established, from Kaitaia in the north to Shannon in the south, seedling plants have been found in 19 and viable seed has been collected in several others.

Water hyacinth flowers from late December through to March in North Auckland and from January to March in areas south of Auckland. There is usually one flowering spike, but sometimes up to three spikes, with about 20 flowers on each plant. When the capsules burst the seeds from the bent spikes are discharged into the water and sink. As there are up to 300 seeds per capsule and as each spike may contain 20 capsules, each plant is capable of producing 5000 to 6000 seeds. The seed falls to the bottom of the pond and will not germinate until the water recedes and the seeds are dried.

At Tiniroto, between Wairoa and Gisborne, a water hyacinth infested lake was drained some 4 years ago. Each summer water hyacinth seedlings strike, but are easily killed by the dry weather that follows. In other areas water hyacinth seeds have germinated on damp soil or on rafts of partly decomposed water hyacinth or damp projections above water level. At Onehunga, Auckland, where the water hyacinth is growing in water which is heated to 100 degrees F. by a hot-water overflow from a factory, five successive crops of seedlings struck in one season.

Water hyacinth seeds usually germinate from January to March, depending on the length of dry weather and the recession of the water level. Up to 1000 seedlings per square foot have been recorded. At Tikitiki, north of Gisborne, in 2 months 15 seedlings multiplied to 140 plants by vegetative propagation and covered approximately 40 sq. ft. The period of seed viability is not known, but at Waima in Northland, successive crops of seeds have struck over the last 6 years. During this period all plants have been destroyed before setting viable seed. This shows that seed will remain viable for at least 5 years.

Because water hyacinth is now known to be setting seed even more vigilance is required in the detection and destruction of infestations as soon as possible. Anyone knowing of areas of water hyacinth is requested to inform the nearest office of the Department of Agriculture so that they can be eradicated.



Seedlings of water hyacinth.

Omelettes

[Sparrow

By MAUD B. STRAIN,

Home Science Instructor, Department of Agriculture, Dunedin

FOR a quick, nutritionally satisfactory meal eggs are the perfect choice, and one of the most attractive ways of serving them is as an omelette. Omelettes are not difficult to make and offer scope for originality in flavouring, as well as being an appetising way of making much out of little. Also savoury omelettes offer scope for the use of appetising sauces, and recipes for some sauces are given here with omelette recipes.

OMELETTES may be plain or puffy. The ingredients are the same for both, but the method is different. Eggs may be used without any other ingredients except seasonings, but a more tender and larger omelette will result if a little liquid such as milk, water, or tomato or fruit juice is added. It is inadvisable to make a very large omelette; two small ones are more likely to be successful. From 4 to 6 eggs are as many as should be used in one omelette.

The Omelette Pan

A good frying pan is essential, one with a moderately thick base, smooth and perfectly clean. Where omelettes are made frequently it is customary to reserve one pan exclusively as an omelette pan, and it should be the right size for the number of eggs used. A pan that is too large for the amount of egg mixture will never produce a good omelette.

The pan is prepared by heating a small amount of butter, from 1 teaspoon to 1 tablespoon, depending on the size of the pan, and when it has melted the pan is tilted so that the butter runs over the bottom and sides. The pan is ready for the egg mixture as soon as a drop of water sizzles in the hot fat. The mixture is cooked over moderate heat and while it is cooking it is pricked with a fork or lifted at the edges with a knife or spatula so that the uncooked portion on top may run down on to the bottom to cook.

As soon as the mixture has set the pan should be tilted forward and the omelette rolled up, similarly to a jam roll, and lifted on to a hot plate. If preferred, when the omelette has set it may be transferred to the oven or under the griller for a little top heat to brown it slightly before it is rolled up, but care must be taken not to overcook it and make it unpleasantly dry and tough.

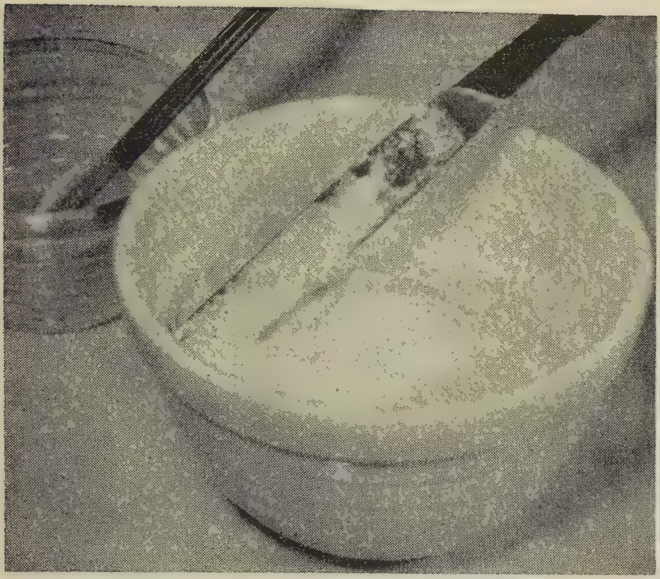
It should be served immediately it is cooked. If it is to be filled the hot, cooked filling such as fried mushrooms, tomato, or bacon is added just before the omelette is rolled over.

If a sweet omelette is required with jam, the jam should be warmed before it is added.

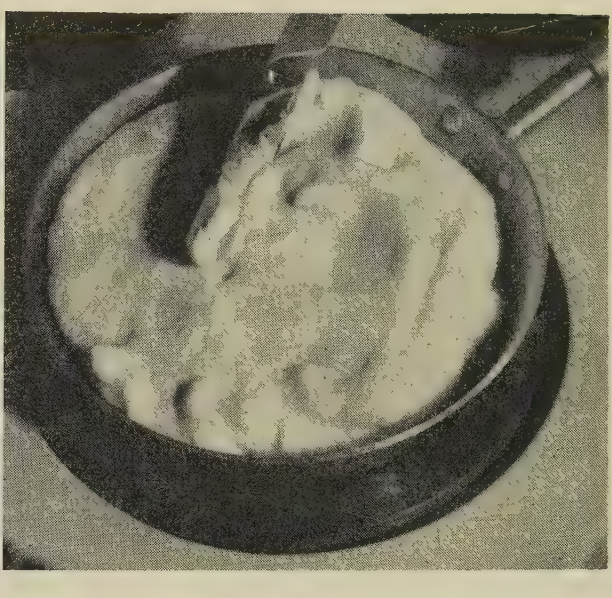
Puffy Omelette

Puffy omelettes have the same ingredients as plain omelettes, but their making is a little more complicated. They are light and fluffy as the name indicates, and may be four or five times as thick as plain ones made from the same ingredients. The yolks and whites are separated.

MAKING A PUFFY OMELETTE

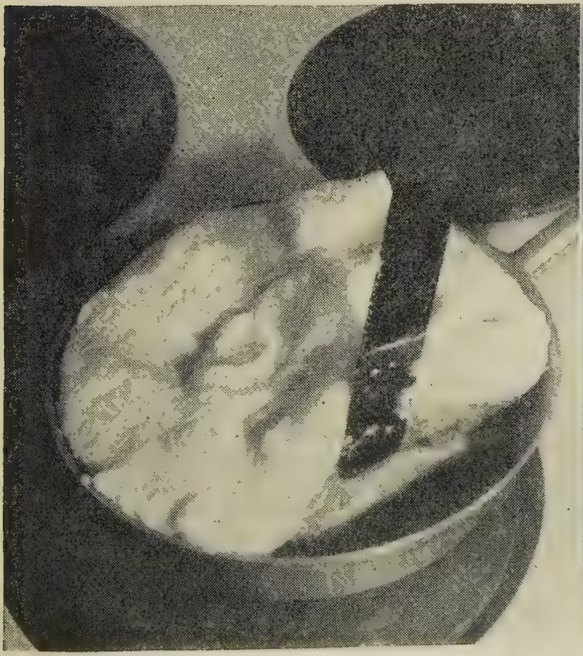


The yolks and the whites of the eggs are separated and the whites beaten until they are stiff and frothy, the yolks until they are thick and lemon coloured. A tablespoon of milk for each egg is added to the beaten yolks and $\frac{1}{4}$ teaspoon of salt for each egg to the whites before they are beaten.

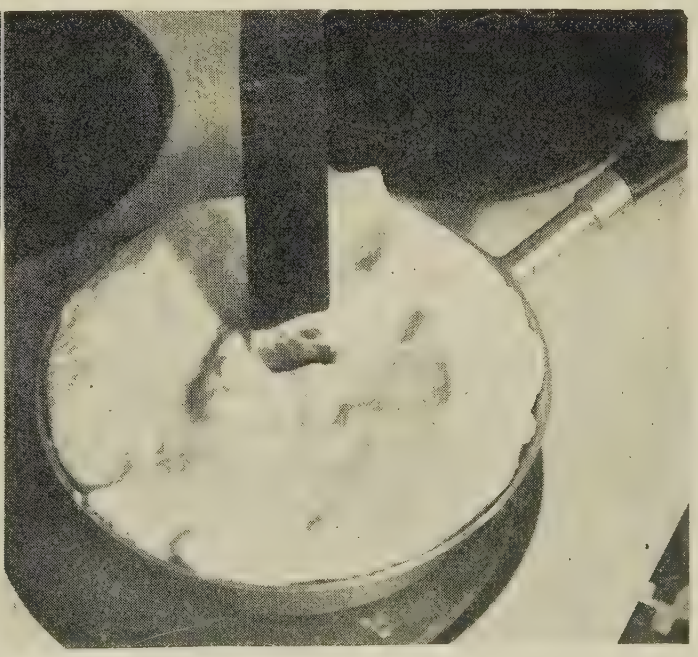


In the omelette pan a tablespoon of butter is melted and made hot but not browned. The egg mixture is poured into the pan and spread evenly with a spatula.

▼ One edge of the omelette is raised to see how the omelette is cooking on the bottom. When it is a delicate, golden brown it may be transferred to a slow oven (325 degrees F.) to cook for about 15 minutes.



▼ If it is not possible to complete cooking in the oven, this can be done on top of the stove. To check if the omelette is cooked insert the spatula in the middle. If it comes out clean and the top of the omelette is springy to the touch, the omelette is cooked.



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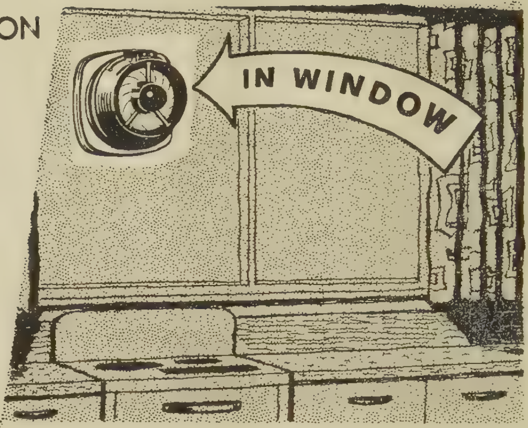

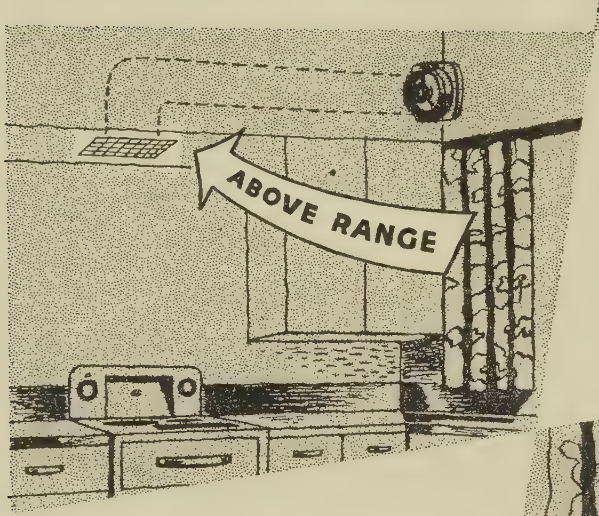

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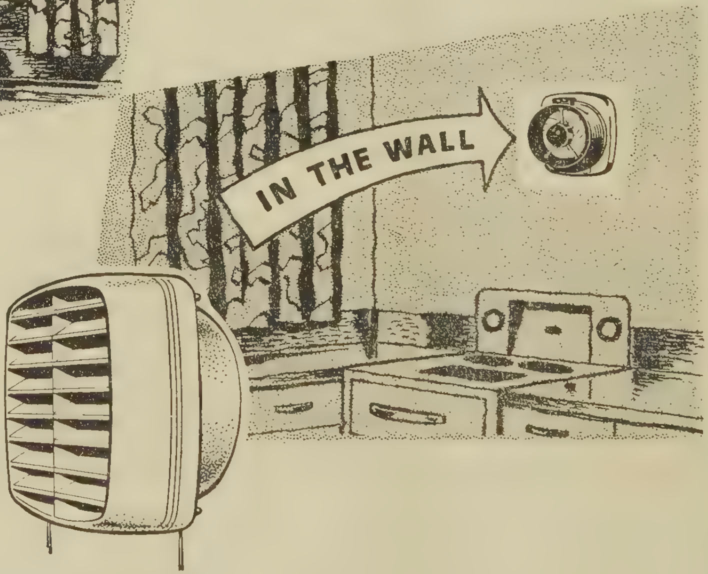

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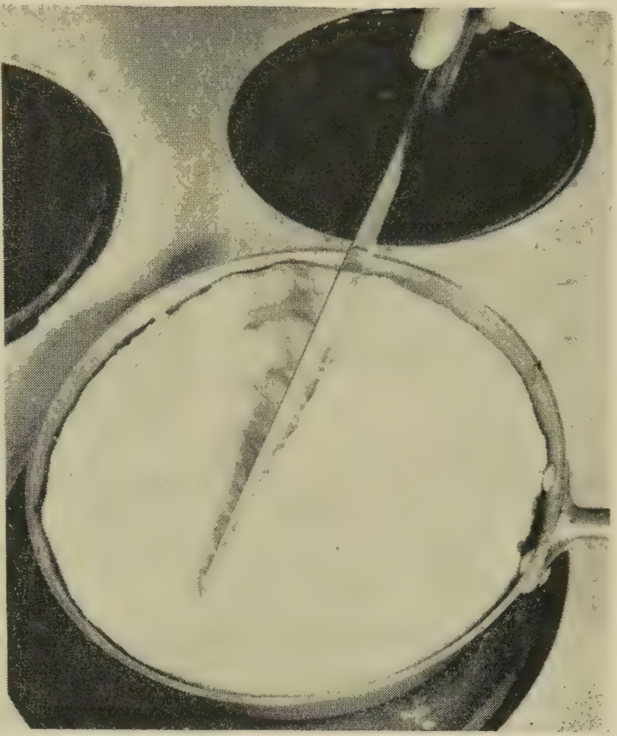
MAKING A PUFFY OMELETTE

The sides of the omelette should be freed all round the pan.



The omelette should be cut across the middle (not quite to the bottom) for ease in folding it over.

Liquid is not necessary in a puffy omelette, but its use gives a larger and more tender product. One tablespoon of liquid to an egg is usually recommended; more than this quantity may make the omelette so tender that it will collapse during cooking. The liquid used determines whether it is added to the yolk or white. Milk or cream is often used in preference to water; either of these must be added to the yolks, because both contain sufficient fat to prevent the whites from beating up stiffly and quite small amounts of fat will interfere with foam formation in egg whites.

If water or a fruit or vegetable juice is the liquid used, it can be beaten in with the egg whites. Yolks are beaten until they are thick and lemon coloured, whites are beaten until they are stiff enough to stay in an inverted bowl, and seasonings or flavourings and liquids are added as desired. The yolks are added to the whites and mixed in carefully; incomplete mixing often results in the yolk separating out and forming a solid layer on the bottom of the omelette, and too much mixing may break down the air cells in the beaten white and give a heavy, compact product. Once mixed the omelette should be cooked immediately, because on standing the liquid settles out and results in a heavy layer. The finished product should be golden brown, well puffed, evenly cooked throughout, tender, well seasoned, and hot.

Recipes

Standard measuring cups (8 fl. oz.) and standard measuring spoons are used in these recipes. All measurements are level.

The liquid used may be water, milk, fruit or tomato juice, or cream. If lemon juice is used, the proportion is 1 teaspoon of lemon juice to 2 teaspoons of water to each egg.

Plain (or French) Omelette

1 egg
1 tablespoon of milk
Shake of pepper
¼ teaspoon of salt
1 teaspoon of butter
Sprig of parsley

Beat the egg with the milk and seasonings sufficiently to be well mixed but not foamy. Melt the butter in the omelette pan and run it round the bottom and sides of the pan. Add the egg mixture and cook it over moderate heat, lifting the edges to let the uncooked portion run underneath and turning the pan to ensure even cooking.

Put the pan under the griller or in the oven for a few minutes to brown slightly. Loosen the omelette all round, then tip the pan forward and roll the omelette on to a hot serving dish. Garnish with parsley and serve immediately.

Variations

Ham omelette: Add a little minced ham to the egg mixture before cooking.

Cheese omelette: Add a little grated cheese before cooking.

Tomato omelette: Use tomato juice instead of milk.

Savoury omelette: Add a teaspoon of chopped parsley, chives, and thyme to the mixture before cooking.

Jam omelette: Omit the pepper and add a teaspoon of sugar to the beaten egg. Spread some warmed jam on the omelette before rolling it up.

Puffy Omelette

1 egg
1 tablespoon of water
Shake of pepper
¼ teaspoon of salt
1 teaspoon of butter
Parsley

Separate the yolk from the white of the egg. Beat the white with the salt until it is a stiff foam. Beat the yolk with the water until it is thick and lemon coloured. Melt the butter in the omelette pan, being careful that the sides and bottom are oiled. Fold the yolk mixture into the stiffly beaten white, and pour the whole into the hot pan, spreading it to an even thickness.

Cook the mixture over moderate heat for ½ minute, then reduce the heat until the omelette is set. Place the omelette in a moderate oven (350 degrees F.) to dry the top. Make a cut half-way across the omelette at right angles to the handle of the pan, fold the omelette in half, and turn it on to a hot plate.

Garnish it with parsley and serve it immediately, with sauce if liked.

Variations

Bread omelette: Make a puffy omelette, doubling the quantities of liquid and salt given in the recipe above and omitting the pepper. Add 2 tablespoons of soft breadcrumbs. Soak the crumbs in the liquid until the liquid is absorbed. Add the beaten egg yolk and seasoning and complete as for a puffy omelette. Spread the omelette with jelly before folding it and sprinkle the top with sugar.

Cheese omelette: Sprinkle grated cheese over the puffy omelette before placing it in the oven.

Fish omelette: Spread chopped cooked fish over the omelette before folding it or add it to the egg mixture before cooking.

Ham omelette: Use minced ham in the same way as fish.

Jelly omelette: Omit pepper from the recipe. Before folding the omelette spread it thickly with jelly beaten until soft.

Orange omelette: Use orange juice for liquid and omit the pepper. Garnish with sections of orange and sprinkle with castor sugar. Serve with whipped cream.

Sauces for Savoury Omelettes

Cheese Sauce

1 cup of milk
1 tablespoon of flour
1 tablespoon of butter
½ teaspoon of salt
½ cup of grated cheese

Melt the butter, add the flour and salt, and cook while stirring until smooth but not brown. Add the milk a little at a time, stirring well until all the milk is used. Cook for 3 to 5 minutes over direct heat, or for 15 to 20 minutes in a double boiler. Add the cheese and stir it in well but do not boil.

Tomato Sauce

4 tablespoons of butter
4 tablespoons of flour
1 slice of onion
1 slice of carrot (optional)
Sprig of parsley
2 cups of tomato juice or pulp
Salt
Pepper

Chop the onion, carrot, and parsley finely and simmer in the tomato juice for 20 minutes. Strain, and add water to make 2 cups of liquid. Melt the butter, stir in the flour, and cook for 1 or 2 minutes. Add the liquid with the seasonings gradually and cook for 5 minutes.

Soubise Sauce

1 cup of milk
3 tablespoons of flour
2 tablespoons of butter
½ teaspoon of salt
Shake of pepper
⅓ cup of finely chopped onion

Melt the butter and cook the onion in it for 3 minutes without browning. Add the flour and seasoning and cook while stirring until smooth but not brown. Add the milk gradually, stirring to prevent the formation of lumps, and cook while still stirring for 3 to 5 minutes.

Photograph by Green and Hahn.

Parsley for Winter Use

DURING winter, when there is little or no growth, parsley is often in short supply. This is unfortunate, because it is the most widely used of the culinary herbs, but it can be dried and stored for winter use. After the parsley has been picked it should be washed to remove any dust and then very thoroughly shaken and left for the water to evaporate.

Unlike the other herbs, most of which can be tied in bundles and hung in a warm room to dry, parsley needs a certain amount of heat for satisfactory drying.

A good method is to tie it loosely in bunches and dry these in a moderately hot oven with the door partly open until the leaves become crisp. Quick drying is imperative if the essential oils that give parsley its characteristic scent are to be retained and too much of its colour is not to be lost. The leaves should not be in contact with the sides of the oven or they will be scorched. One of the grids should be placed high in the oven and the loosely tied bunches of parsley suspended from the grid to hang freely without touching any part of the framework of the oven.

As soon as the parsley is dry the stems should be removed and the leaves crushed and kept in airtight jars away from the light.

—*MAUD B. STRAIN,*
Home Science Instructor,
Department of Agriculture,
Dunedin

Laundering Silicone-treated Fabrics

FABRICS treated with silicones are water repellant and resistant to stains and the use of a solvent on them to remove grease spots does not leave behind a tell-tale ring.

Silicone proofing stands up to normal washing and should last throughout the life of the fabric, but particular care must be taken with rinsing. Every trace of soap or detergent must be thoroughly washed out, since the slightest trace of dissolved fatty matter or cleaning agent leaves a film over the fibres and prevents the proofing action.

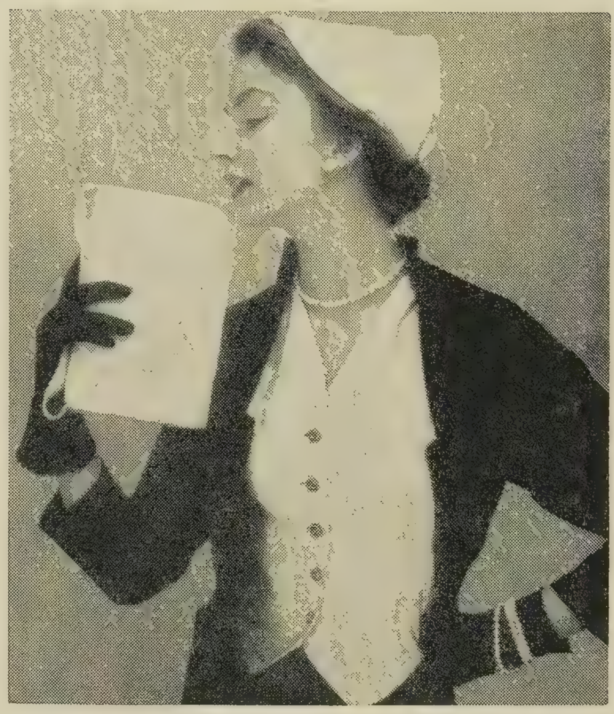
The treated fabrics should be washed in medium-hot water in the usual way and rinsed until the rinsing water shows no trace of soap or detergent. Only in this way will the proofing maintain its full effect.

Ironing heat should be that normally suitable for the fabric concerned.

—*MAUD B. STRAIN,*
Home Science Instructor,
Department of Agriculture,
Dunedin

White Moire Ribbon Waistcoat, Hat, and Bag

THE matching moire ribbon waistcoat, hat, and bag shown in the illustration will add elegance to a variety of outfits. Instructions for making the articles are given here.



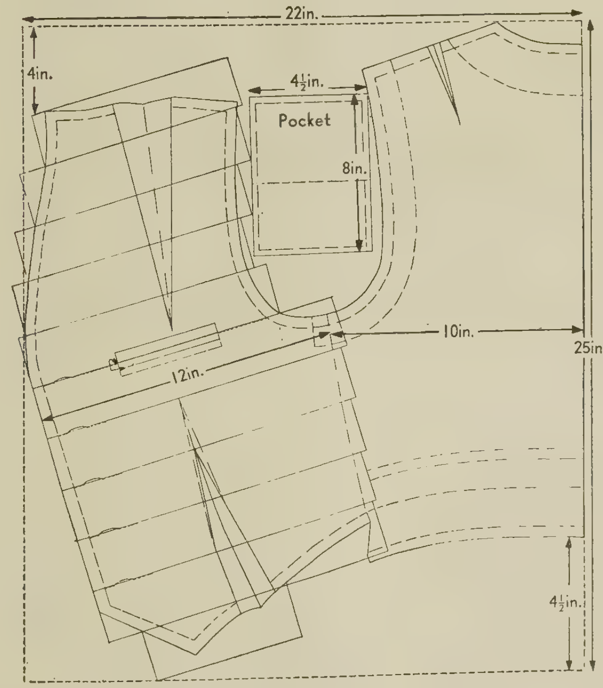
THE WAISTCOAT

MATERIALS required are: 6½yds. of 2in. white moire ribbon; ¾yd. of 54in. rayon jersey fabric; 5 buttons; ½yd. of hat elastic.

To make: First make a paper pattern according to the measurements given in the diagram. Turnings are allowed for on the diagram. If preferred, any simple waistcoat pattern may be used.

Cut out the back and lining for the front in one piece in the jersey fabric. Sew darts at the shoulders and waist (on the wrong side). Turn under and stitch the lower edge of the back; make a slot for inserting the elastic by working another row of stitching as shown by the dotted line in the diagram. Lay the ribbon for the fronts on the pattern as shown in the diagram; oversew or machine the edges together, leaving spaces for the buttonholes on the right front and for the pocket on the left front. Sew the shoulder and waist darts matching the line of the ribbon. Insert doubled ribbon for the pocket welt (after turning in the ends); fold the pocket lining and stitch to the lower edge of the pocket welt and the top of the pocket slit. Turn under the outside edges of the ribbon front and press. Tack the lining to the front and sew together. Sew the front lining and back together at the shoulders, then sew the ribbon front over the seam. Sew the ribbon fronts neatly to the jersey fabric at the side edge.

Face the back armholes with a 1¼in. strip of jersey fabric, and face the back neck edge with a 2in. strip. Make slits for the buttonholes in the lining to match the ribbon front, and oversew neatly to the ribbon. Sew on the buttons.

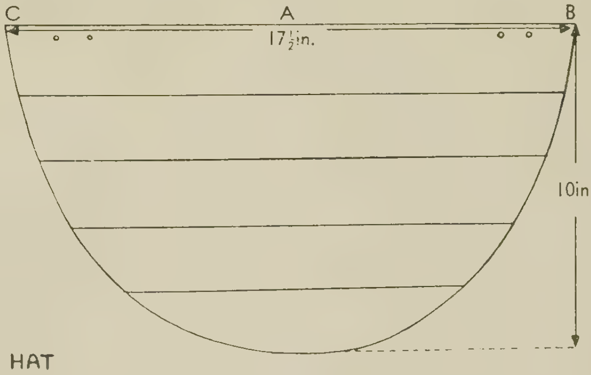


Pattern for the waistcoat.

THE HAT

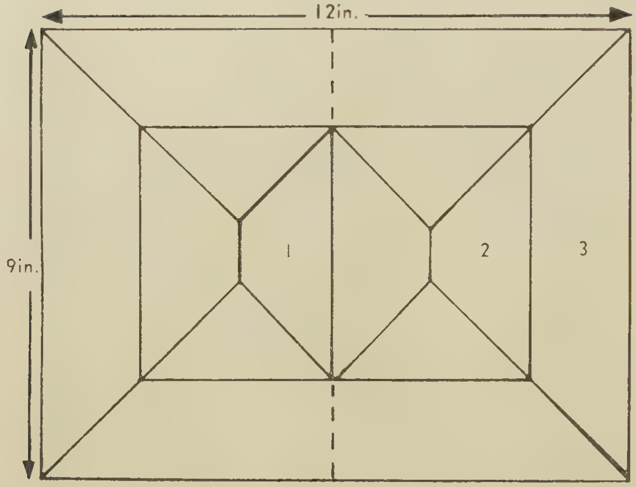
Materials required: 4yds. of 2in. white moire ribbon; lining material 17½in. x 10in.

To make: Join 5 pieces of ribbon 17½in. long together to make a rectangle. Cut as shown in the diagram. Join A-B to A-C. Cut and sew the lining to the ribbon shape. Pipe round the brim with a piece of doubled ribbon. Make eyelet holes to take the ribbon draw-string, as indicated. Make a fold in the centre back at top to fit the head.



Pattern for the hat.

WHITE MOIRE RIBBON ENSEMBLE



Pattern for the bag.

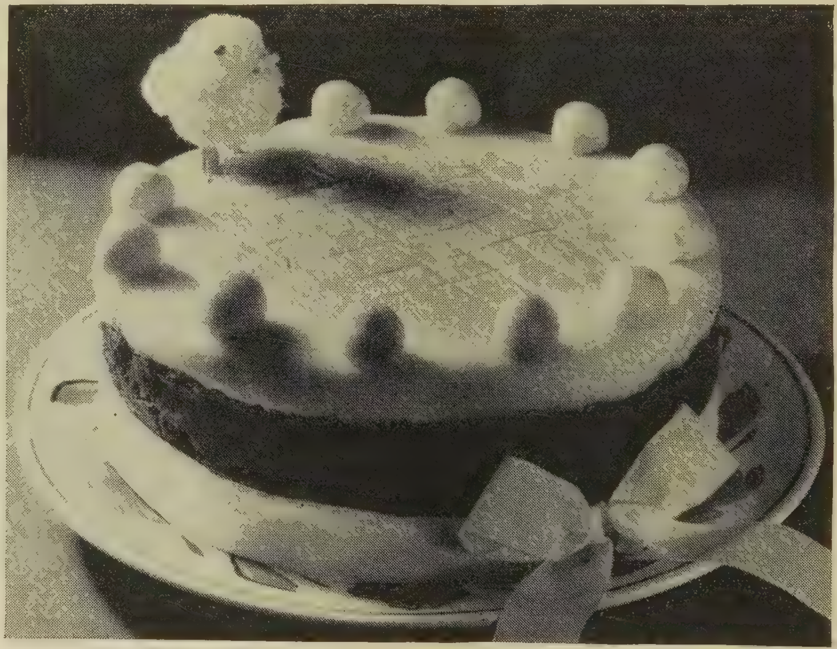
THE BAG

Materials required: 4yds. of 2in. white moire ribbon; a small piece of green ribbon and a small piece of red ribbon (each piece of ribbon to be rolled into a cylinder for trimming); a piece of cardboard 9¼in. x 12in.; a 9in. slide fastener (white); a small length of gold thread; ⅝yd. of lining material; a piece of canvas 25in. long x 1½in. wide.

To make: Take two 18½in. lengths of ribbon and mitre each corner as shown in the diagram (1 and 2). Then sew along the centre. Oversew the two pieces together to form the centre of the bag (back and front). Take a piece of ribbon 42¾in. long, mitre the corners, and sew to the centrepiece as indicated in the diagram (3). For the gusset and handle (which are in one piece) take a 25in. length of ribbon, turn in the ends, and double and oversew.

Double the canvas and with a safety pin draw the ribbon through; crease each end and oversew to the sides of the bag, pushing the crease of the gusset to the inside. Sew the red and green cylinders in front, wind gold thread over the centres, and sew. Bend the cardboard in the centre and insert inside the bag; stitch invisibly to the top mitres. Cut the lining 11¼in. x 13in. Sew the side seams together, turn the top edges over, and tack to the edges of the slide fastener. Oversew the lining and slide fastener to the bag edge.

Simnel Cake



[Sparrow

THE Simnel cake illustrated is the traditional English cake for Simnel or Mothering Sunday (the fourth Sunday in Lent). It is, however, also considered suitable for Easter Sunday and also is a most useful cake to have over the Easter period, when one is liable to have more visitors than usual.

IT is a fruit cake which is iced and decorated with almond paste on top and which has another layer of almond paste put in the middle of the mixture before the cake is baked. This gives a very pleasant almond flavour.

Though the cake will keep fairly well, it is quite satisfactory when made only a few days before it is eaten.

The recipe for almond paste is given with the cake recipe. However, as the price of ground almonds is very high, 1lb. of bought almond icing can be substituted.

Simnel Cake

8oz. of flour
½ teaspoon of nutmeg
10oz. of currants
1oz. of mixed peel
1oz. of nuts
6oz. of castor sugar
Milk to mix
¼ teaspoon of salt
½ teaspoon of cinnamon
6oz. of sultanas
1oz. of glace cherries
6oz. of butter
3 eggs

Almond Paste

12oz. of castor sugar
1 egg
8oz. of ground almonds
Juice of ½ lemon

Almond Paste

Mix the ground almonds and sugar together, beat the egg lightly, and add it with the lemon juice to the dry ingredients. Mix to a paste and knead thoroughly. Take a third of this mixture and roll it into a round slightly smaller than the size of the tin in which the cake is to be baked.

The Cake

Sift the dry ingredients and add the cleaned, mixed fruit. Cream the butter and sugar very thoroughly and then beat in each egg separately. Stir the flour and fruit mixture into the creamed mixture and add a little milk if required to give a dropping consistency. Put half the mixture into a greased, lined cake tin (7in. diameter), smooth the top carefully, and cover with the round of almond paste. Put the remainder of the cake mixture on top and bake in a moderate oven (325 degrees F.) for 2½ to 3 hours, depending on the thickness of the cake. Cool.

Cover the top of the cake with a round of almond paste and decorate with small balls of paste placed round the edge (11 is the traditional number).

If using home-made almond paste, brush the icing with a little beaten egg and brown it quickly in a very hot oven or under a grill. If using bought almond icing, do not grill the cake, as the icing will melt.

—*CHRISTINE LYONS,*
Home Science Instructor,
Department of Agriculture,
Auckland

Climbing Plants in Flower Garden

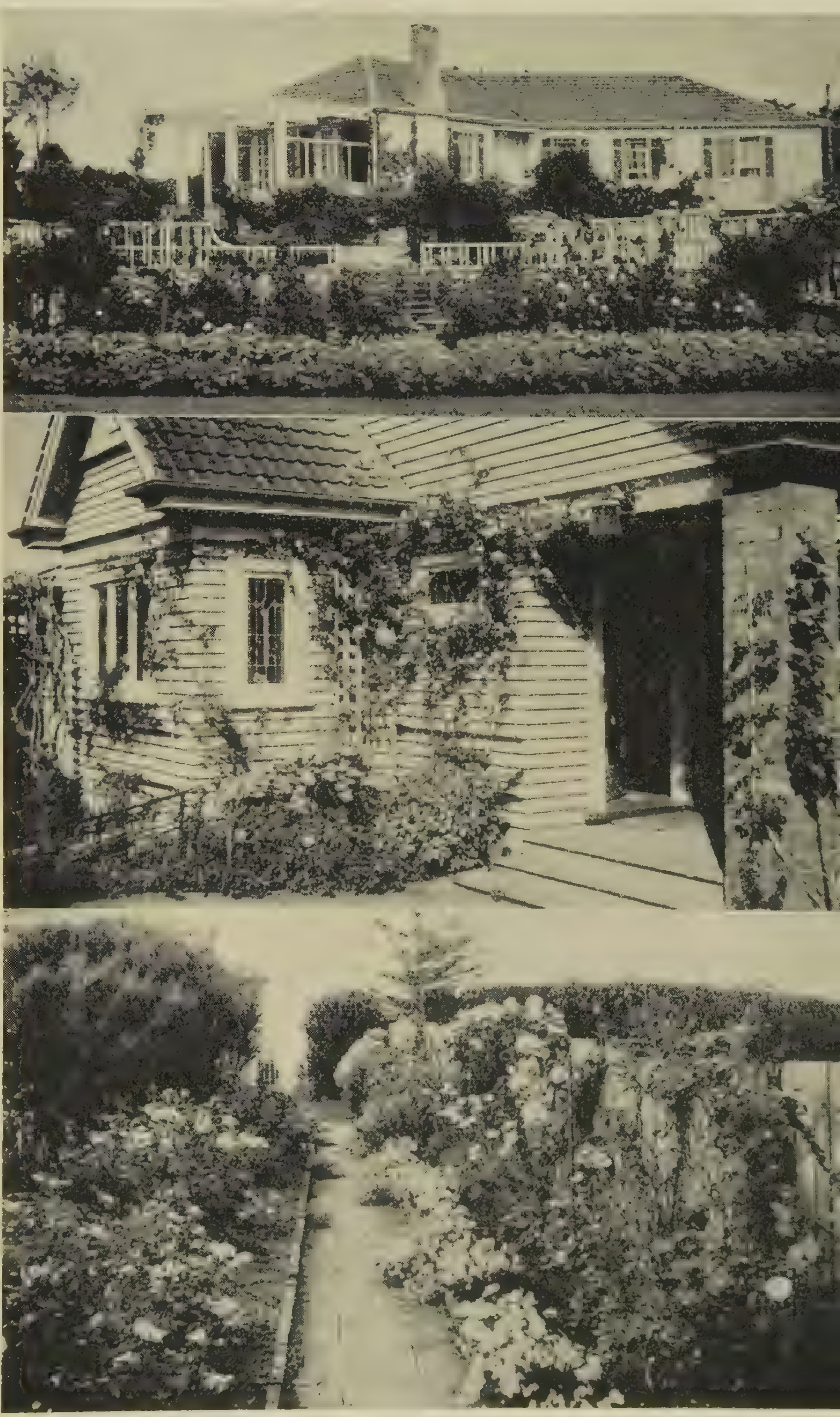
CLIMBING plants have a very important place in ornamental gardening which is not generally appreciated, for they are regarded frequently only as something to cover an unsightly shed or fence. Their uses are many and in this article J. S. Say, Horticulturist, Department of Agriculture, Auckland, points out ways in which this diverse, interesting, and yet often not fully appreciated range of plants can be used. The notes on garden work for March are by Rosalie A. Campion, Horticultural Instructor, Department of Agriculture, Wellington.

CLIMBERS offer wonderful opportunities to the gardener for they include many of the most beautiful flowering plants as well as others with attractive growth habits, foliage, fruit, and seed pods.

Climber is rather a loose term, for plants raise themselves in a number of ways. Knowledge of the manner adopted by individual plants is important if the most suitable plant is to be selected for a position, or if support is to be provided for a desired plant.

Wisteria and snail creeper are examples of those which twine round their supports if they are not too thick. A wire is better for these than a thick post or tree trunk. Passion vines and clematis hook on and cling to wires, twigs, and other comparatively thin objects by tendrils or tendril-like leaf stalks. Others such as ivy cling to and climb most solid surfaces by means of rootlets. Another group, which includes Virginia creeper, has tendrils with adhesive discs which allow the plants to climb solid surfaces. These two groups are often called self-supporting climbers.

Climbing roses, ramblers, and many other rose species belong to a group of scrambling plants which can raise themselves to considerable heights by weaving in and out through a trellis, another plant, or older growths which they have themselves produced in previous seasons. Some of these have hooks on the leaves or stems to assist by anchoring the plant to its support. Under cultivation many in this group require assistance such as being tied to the support.



UPPER—Plants climbing over → walls and trellis unite the house and garden and, besides being attractive in themselves, form an excellent background to the flower beds. MIDDLE—The Banksia rose making a light tracery on the walls adds to the attractiveness of this front entrance. LOWER—Climbing roses are excellent for covering wooden fences.

SELWYN
GUMBOOTS

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BY SKELLERUP

GUMBOOTS

Many shrubs with lax or prostrate habits can with a little assistance also be induced to climb and can be included with the scrambling climbers.

In addition, shrubs and small trees which are amenable to pruning and training can be used as climbers. Cydonia, abutilon, and pyracantha are examples of these. Fruit trees trained as cordons, espaliers, and fans can serve the same purpose as climbers.

Many people have strong objections to using climbers against the walls of houses. Apart from the inconvenience caused when repairs or painting are being carried out, most of the objections are not valid provided suitable types are chosen and are given appropriate support.

Self-supporting climbers should not be planted against wooden walls but do no harm to brick or concrete. Twining and scrambling climbers and those with tendrils should always be grown against a trellis, wires, or similar support, preferably set some inches from the wall, especially if it is of wood.

Some climbers which are inclined to force themselves under boards, tiles, and iron should be watched and prevented from doing so.

It is often said that self-supporting climbers keep brick walls damp, but in general this is not correct, for it will often be found that the wall is drier under them than exposed parts. Dense, vigorous growers will make rooms dark and damp if allowed to drape too thickly over windows, verandas, and doorways.

Uses

Pergolas and archways covered with climbers and semi-scandent shrubs are frequently seen in gardens, but it is better to avoid these structures in small home gardens unless they are carefully designed, well placed, and in harmony with the house and garden. Pergolas are most suitable for gardens in hot, dry climates, where they are used to provide cool, shady walks. In New Zealand they are often more of a nuisance than an attraction, especially when used over main pathways. When covered with climbers they are unpleasant in wet weather or in winter because of drips and shade, and, when left bare, they are purposeless.

If pergolas are desired, they should be used over secondary paths which serve some function such as connecting house and garden or two parts of the garden. Pergolas should not be set down in lawns merely as supports for climbing plants. More suitable and appropriate supports can be provided to display them.

Climbing plants can do much to add to the attractiveness of a house, for they can be used to enhance good architecture and, to some extent, to disguise less pleasing features. Whether a light tracery or a solid mass is used will depend on the design and material of the house. The main effect of climbers on the house, when used with other plantings at the base, is to unite the house and the garden. Climbers are particularly useful on houses with very high foundations or where there are large blank walls of little architectural beauty.

Used on fences or trellis, climbers make an attractive background to flower borders. A covered trellis makes an excellent screen to give privacy or to block out unattractive views and is especially useful where space is too limited to grow a hedge or trees.

In mixed flower borders and shrub borders climbers on posts or tripods make excellent accent plants and can be used to give height without taking up too much space.

Climbers and scrambling shrubs can be used very successfully in solving one of the most difficult of gardening problems, that of covering banks which are too steep or rocky to establish lawns or shrubs. Vigorous species may be planted at the base or, more effectively, at the top and allowed to cascade over. Tree stumps, dead trees, and other objects which cannot be removed can be disguised and often transformed into features which are an asset to the garden instead of a disfigurement.

Where shade is required in summer but not in winter such as round an outdoor living area annual, herbaceous, or deciduous climbers should be used. Annuals, for example *Mina lobata*, are very useful for providing a quick effect and can be used while slower-growing permanent plants are becoming established.

The ornamental value of passion fruit, chinese gooseberries, and grapes should not be overlooked.

Choice

Most climbers are not difficult to grow and provided varieties suited to the position, climate, etc., are chosen, little trouble should be experienced in getting them established.

When a choice is being made the following points should be considered: —

1. **Purpose:** Is it wanted to blanket an ugly fence or wall, for flowers, for autumn colour, or for some other particular purpose?

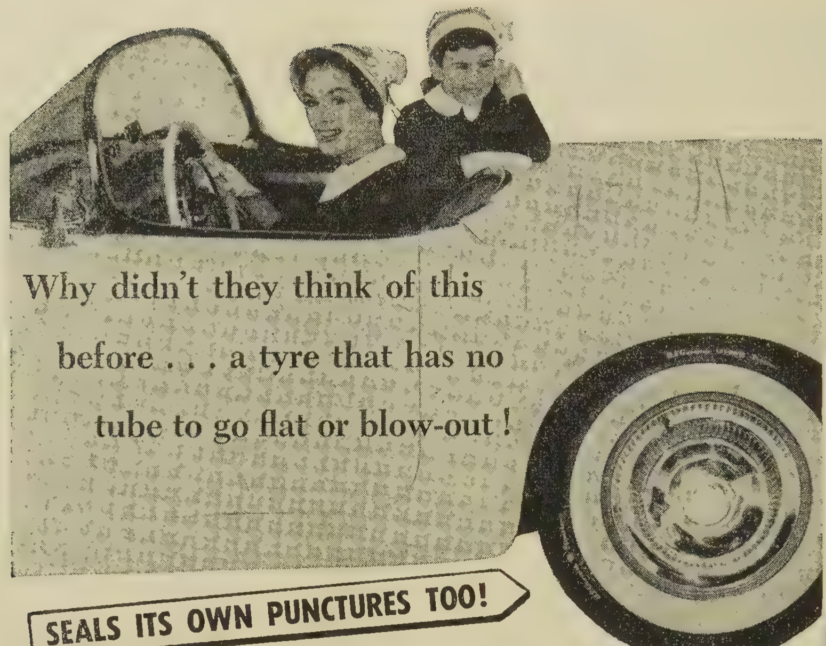
2. **Support:** Is the available support suitable; if not, can it be provided?

3. **Growth habit:** Many climbers are slow growing, while others are embarrassingly fast. Rampant growers should be avoided unless it is certain that space is available for them to develop. Some are dense while others are light and open.

4. **Situation:** Under this heading comes hardiness to frost and wind, etc., ability to stand sun or shade, and suitability to soil condition.

▲ Spring flowering clematis, *C. armandi.* Elliott photo.

▼ Clematis Nellie Moser is one of the most popular of summer flowering climbers. The flowers are mauve with a pink bar on the petals. Elliott photo.



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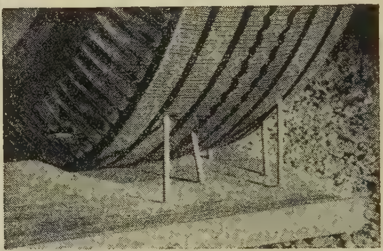

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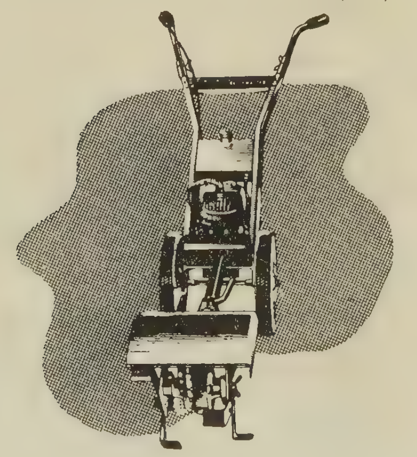

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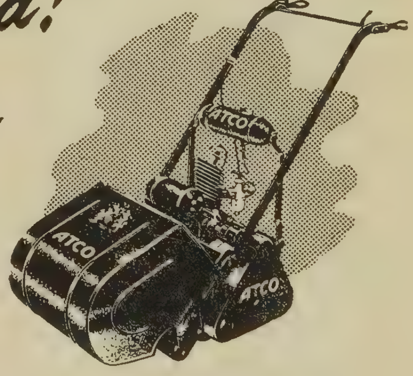

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▲ New Zealand native clematis *C. indivisa.* Like all clematis it needs a cool, moist root run, but must have its head in the sun.

Planting and Soil Preparation

With the exception of annuals, which are planted for quick effect, climbers are usually put in as permanent features in the garden and deserve the best treatment. Like trees and shrubs they are often given the minimum of preparation and consequently take a long time to become established.

Climbers, probably more than most plants, have to contend with adverse soil conditions. They may be expected to grow in the narrow strip between house and path, under eaves where the soil becomes dry, or against south walls where it becomes excessively wet and cold. At the bases of trees the soil is often impoverished and matted with roots. In new houses the soil is often heavily compacted at the bases of the walls.

The area should be dug thoroughly, and organic matter worked in. Some blood and bone can be added to the soil under the plant when it is put in. Drainage should be attended to where the soil is heavy and remains wet.

Most climbing plants are satisfactory in average soil, but some are better planted in poor soils, while a few demand special attention. Clematis belongs to this last class. It requires a cool, moist soil with plenty of organic matter, good drainage in winter, and some lime, but the tops must be in the sun.

Some very vigorous growers such as wisteria, bougainvillea, Virginia creeper, and some of the bignonia family are better in poorer soils, for it has the effect of limiting growth a little and promoting earlier flowering. This does not mean that they should be planted in a poor, hard soil with no preparation. The position should be well dug and to give the small plant a good start organic matter and fertiliser may be added, but the area into which the roots will spread need not be enriched.

Maintenance

During summer young plants should not be allowed to suffer for the want of water. Weaker growers can be given fertilisers and compost each year. Young plants should not be allowed to become smothered by vigorous plants in front of them.

Pests and diseases are not usually a problem, but attacks of aphids, scale, caterpillars, mites, and various fungous diseases such as mildew and rust sometimes occur. Spraying, should it be necessary, should be thorough, for it is difficult to get good coverage on the stems and undersides of the leaves where climbers are hard against a wall. Lime sulphur should not be used on plants trained against painted woodwork, as it discolours the paint. Slugs and snails often do a lot of damage to the young growths of some of the more tender species.

Training

Self-supporting climbers and those which have tendrils or a twining habit do not require much attention provided the correct support is provided, but even a comparatively rampant grower like wisteria, planted against an old tree, will not flourish in the early stages if it has nothing to twine round. Wires or thin stakes should be provided to give it a start. Ivy, Virginia creeper, and similar types should be held firmly against their support until they can attach themselves with their rootlets. A little tying may be needed and it is sometimes necessary to control the direction of growth.

To get a well-furnished base the tips of the shoots may be pinched out to encourage side growths, and in some cases pruning may be necessary during the first winter to shape the plant.

Scrambling climbers and shrubs used as climbers must be provided with a support and will generally need assistance to use it. Some will weave in and out, but most will need tying in. This practice is better in all cases so that growth can be kept to the desired direction and on one side of the support. If this is done, pruning becomes easier, painting and repairs to

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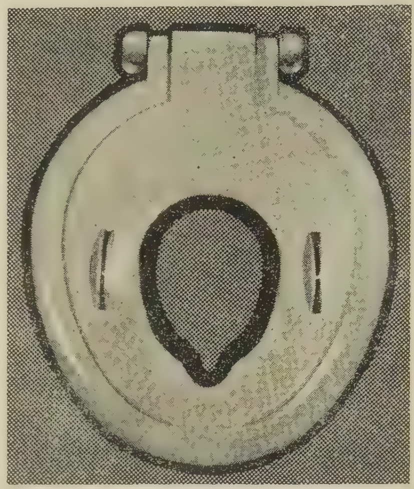

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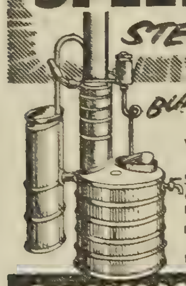

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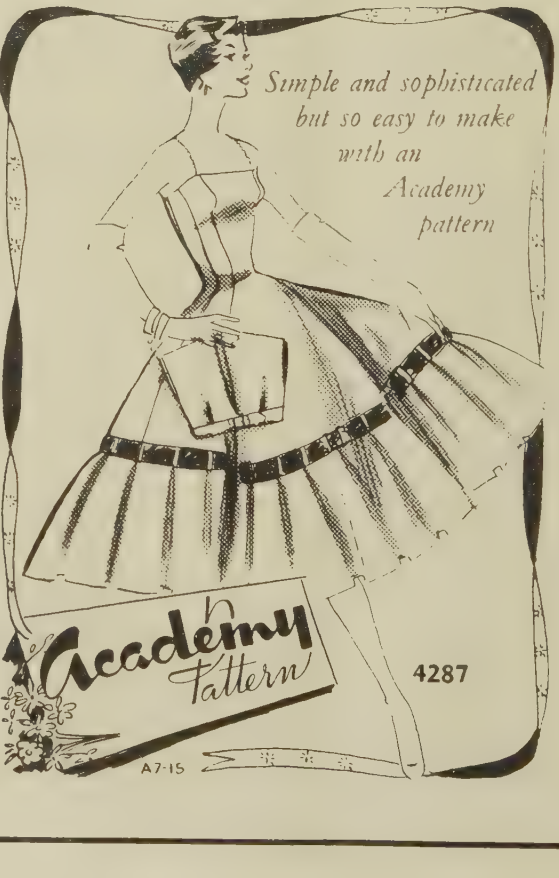


buildings are facilitated, and trellises will not be broken as the stems swell with age. Shrubs used as climbers should be tied in flat against the support and any shoots which cannot be brought in or are too crowded should be cut out.

Anyone wishing to train fruit trees as espaliers, cordons, or fans is advised to consult a book on the subject, for this is a complicated though not very difficult process.

Pruning

Except for roses and clematis, climbers present few difficulties when it comes to pruning. The pruning of climbing and rambler roses was described in an article on roses in the February 1955 issue of the "Journal".

Clematis species and hybrids are confusing, as some flower in spring on old wood and some later in the year on new wood. Clematis such as *C. montana* and *C. armandi* should be pruned after flowering. All that is needed as a rule is to thin out some of the old wood which is declining in vigour to encourage new growths which will flower the following year. The second group which includes *C. jackmani*, *C. lanuginosa* with their large flowered hybrids and varieties should be cut back severely to well-founded buds on firm wood in late winter.

Wisterias can be helped to flower earlier and more profusely by pruning. To encourage the formation of flower spurs all the vigorous young growths not required for extending the plant should be cut back to two or three buds. Secondary shoots arising from these should also be cut back to two or three buds and this process should be continued right through the season.

The principles which govern the pruning of shrubs also apply to climbers. Those which flower in late winter-early spring are pruned after flowering, and those which flower later in the year are pruned in winter or early spring. Examples of the former are wisteria and wall shrubs such as *Jasminum primulinum* and forsythia and of the latter *Solanum wendlandi*.

Apart from shaping and training pruning consists mainly of cutting out dead and diseased or worn-out wood, thinning out crowded or weak growths, and shortening back vigorous growers to keep them under control. But it should be noted that severe pruning of very strong growers will promote a flush of further vigorous growth with few flowers.

Climbers grown for foliage effect only are usually pruned in winter or early spring. The removal of dead, diseased, or crowded growths is about all that is needed. Evergreens such as ivy and ficus may be trimmed with hedge shears in winter or early spring.

▲ The orange, trumpet shaped flowers of *Pyrostegia venusta* (*Bignonia venusta*) make a wonderful show in winter in a warm, sheltered position. Elliott photo.

▼ *Cobaea scandens* is a rather rampant climber with masses of purple flowers in summer. It is usually classed as a half-hardy annual, but under favourable conditions will last a number of years. Elliott photo.

Nomenclature

The botanical nomenclature of a number of climbing plants is very confused, for many botanists are not in agreement about the naming of several common species. This confusion is reflected in trade catalogues. The large group of plants commonly known as bignonias has been split up into about half-a-dozen genera, and authorities also differ in placing many of the species within the various genera. Bignonias may be found listed under bignonia, campsis, doxantha, pandorea, podranea, pyrostegia, and tecoma.

Virginia creeper and other members of the ornamental grape family may be found under ampelopsis, parthenocissus, or vitis. The well-known annual climber *Mina lobata* is now more correctly quamoclit.

The Chart

The chart on page 206 has been compiled to assist gardeners in selecting suitable climbers. All the plants are available in New Zealand, but the list, though fairly extensive, represents only a fraction of climbers popular in overseas countries. A few shrubs have been included, but there are many more which are suitable, for example, azara, buddleias, ceanothus, chaenomeles (cydonia), chimonanthus (winter sweet), *Euphorbia splendens* (crown of thorns), garrya, hibiscus, and hamamelis (witch hazel). Hardiness, flowering time, and vigour will vary according to climate, soil, and other local conditions, and allowances should be made for them.

CLIMBERS FOR NEW ZEALAND GARDENS

Explanation of terms and symbols used in the chart—E (evergreen), D (deciduous), A (annual), P (perennial), H (herbaceous), W (strong, woody growth), Sh (shrub), Sc (scrambling) Ss (self-supporting); Tw (twining), Ten (tendrils), S (small), M (medium), V (vigorous), Vv (very vigorous), HH (half hardy), H (hardy), T (tender). * indicates that there are other species available. † indicates that there are varieties differing from the species described. Differences are shown in the various columns.

Type	Hardiness	Climbing habit	Vigour	Position				Soil			Name	Foliage				Flowers					Fruit			
				Full sun	Semi-shade	Shade	Glasshouse	Average	Moist	Dry		Attractive	Variegated	Coloured	Atmn. colour	Spring	Summer	Autumn	Winter	Fragrant	Summer	Autumn	Winter	Edible
EWP	HH	Sh	S-M	☆	☆			☆			Abutilon varieties					☆	☆	☆	☆					
DWP	HH	Sc	Vv	☆	☆			☆			_Actinidia chinensis_ (Chinese gooseberry)					☆							☆	☆
DWP	H	Tw	M	☆	☆			☆			_Akeba quinata_	☆				☆	☆			☆		☆		
EWP	T	Tw	M				☆	☆			_Allamanda cathartica_					☆	☆	☆						
											Ampelopsis (see Parthenocissus)													
EP	HH	Tw	M	☆	☆			☆			_Aristolochia* macrophylla_ (Dutchman's pipe)	☆					☆	☆						
EWP	HH	Tw	M		☆				☆		_Berberidopsis corallina_ (Coral vine)	☆					☆							
EWP	HH	Tw	M-V	☆				☆			_Bignonia unguiscati_ (_B. tweediana_)					☆	☆							
EWP	H	Tw	M-V	☆				☆			_Billardiera longiflora_ (Tasmanian blueberry)											☆		
EP	HH	Tw	S-M	☆			☆	☆	☆		_Bomaria* multiflora_					☆	☆	☆						
EWP	HH	Sc	V-Vv	☆				☆			Bougainvillea varieties						☆							
EWP	H	Ss/Sc	Vv	☆	☆			☆	☆		_Campsis Mme. Galen_					☆	☆							
DWP	H	Ss/Sc	Vv	☆	☆			☆	☆		_C. radicans_						☆							
DWP	H	Sc	V	☆	☆			☆			_Celastrus scandens_											☆	☆	
EWP	H	Ten	M	☆				☆	☆		_Clematis* armandi_					☆								
DWP	H	Ten	M	☆				☆	☆		_C. montana_					☆								
DP	H	Ten	M	☆				☆	☆		_C. jackmani_ and hybrids						☆							
EWP	T	Tw	S				☆	☆			_Clerodendron* thompsonae_						☆	☆						
A or P	HH	Tw	M-V	☆	☆			☆		☆	_Cobaea scandens_						☆	☆				☆		
D/EWP	H	Sh	S	☆	☆			☆		☆	_Cotoneaster* horizontalis_					☆						☆	☆	
EWP	H	Sh	S	☆	☆			☆			_Euonymus radicans_† (_fortunei_)		†											
EWP	HH	Ss	M†-V	☆	☆			☆		☆	_Ficus pumila_ (_stipulata_)†	☆		☆										
DWP	H	Sh	S-M	☆	☆			☆			_Forsythia* spectabilis_				☆	☆			☆					
DWP	HH	Sh	S-M		☆	☆	☆	☆	☆		Fuchsia, vigorous species† and hybrids†		†	†		☆	☆	☆				†		
EWP	H	Tw	S-M	☆	☆			☆			_Gelsemium sempervirens_ (Caroline or false jasmine)					☆			☆	☆				
P	HH	Tw	S	☆			☆	☆	☆		_Gloriosa superba_ (Climbing lily)						☆	☆						
EWP	H	Sc	M-V	☆				☆			_Hardenbergia* comptoniana_					☆			☆					
EWP	H	Ss	M†-V	☆	☆	☆		☆		☆	_Hedera* helix_† (_Ivy_)	☆	†											
EWP	H	Tw	M	☆	☆			☆			_Hibbertia volubilis_ (Guinea gold vine)						☆							
EWP	H	Tw	M	☆							_Holboellia latifolia_						☆					☆		
EWP	T	Tw	S	☆	☆		☆	☆			_Hoya carnosa_ (Wax flower)					☆	☆			☆				
A or P	T	Tw	M-V	☆				☆			_Humulus japonica_ (Common hop)											☆		
DWP	H	Ss	M-V	☆	☆			☆	☆		_Hydrangea petiolaris_ (Climbing hydrangea)						☆							
											Ipomoea (see Pharbitis)													
EWP	HH	Tw/Sc	M	☆				☆			_Jasminum* polyanthum_ (Jasmine)					☆				☆				
EWP	HH	Sc/Sh	M	☆				☆			_J. primulinum_					☆			☆					
EWP	H	Sc	M	☆	☆			☆		☆	_Kennedya* rubicunda_								☆					
EWP	HH	Sc/Sh	S-M	☆				☆		☆	_Lantana* sellowiana_					☆	☆	☆						
EWP	T	Tw	S		☆	☆	☆		☆		_Lapageria* rosea_ (Chilean bell flower)						☆							
EP	H	Ten	S-M	☆				☆			_Lathyrus pubescens_ (Argentine pea)					☆			☆					
EWP	HH	Tw/Sc	Vv	☆	☆			☆		☆	_Lonicera* hildebrandiana_ (Burmese honeysuckle)						☆			☆				
DWP	H	Tw	V	☆	☆			☆		☆	_L. sempervirens_ (Trumpet honeysuckle)					☆								
DWP	H	Tw	M-V	☆				☆			_Mandevilla suaveolens_ (Chilean jasmine)						☆	☆		☆				
EWP	HH	Tw	S	☆			☆	☆			_Manettia bicolor_						☆	☆						
A or P	HH	Tw	V	☆				☆			_Maurandia erubescens_						☆							
											Mina lobata (see Quamoclit)													
EWP	T	Ss/Sc	V	☆	☆		☆	☆	☆		_Monstera deliciosa_	☆										☆	☆	☆
EWP	HH	Sc	V	☆				☆			_Pandorea* jasminoides_					☆								
DWP	H	Sc	V	☆				☆			_P. ricasoliana_ (_Tecoma mackeni_)						☆							
DWP	H	Ss	Vv	☆	☆			☆		☆	_Parthenocissus* quinquefolia_ (Virginia creeper)	☆			☆									
DWP	H	Ss	Vv	☆				☆		☆	_P. tricuspidata veitchi_ (Small leaf Virginia creeper)	☆			☆									
EWP	HH	Ten	V	☆				☆			_Passiflora* edulis_ (Purple passion)					☆	☆					☆	☆	
EWP	HH	Ten	M-V	☆				☆			_P. van-volxemi_ (Red flowered banana passion)							☆	☆				☆	☆
EWP	HH	Sc	V-Vv	☆				☆			_Phaedranthus buccinatorius_ (Blood trumpet)					☆	☆	☆						
EP	HH	Tw	M-V	☆				☆		☆	_Pharbitis leari_ (_Ipomoea_)					☆	☆	☆						
EP	HH	Tw/Ten	S-M	☆				☆		☆	_Phaseolus caracalla_ (Snail creeper)					☆	☆							
EWP	T	Sc/Sh	M	☆				☆			_Plumbago capensis_						☆							
ENP	H	Ss	V	☆				☆			_Podranea brycei_								☆					
EWP	H	Ss	V	☆				☆			_Pyrostegia venusta_ (_Bignonia venusta_)								☆					
A	HH	Tw	S-M	☆				☆		☆	_Quamoclit lobata_ (_Mina lobata_)						☆	☆	☆					
EWP	HH	Sc/Sh	S	☆				☆			_Reinwardtia trigyna_								☆					
DWP	H	Sc	M-V	☆				☆			Roses, climbing h.t., ramblers					☆	☆			☆				
DWP	H	Ss	V	☆	☆			☆			_Schizophragma hydrangeoides_ (Climbing hydrangea)						☆							
EWP	T	Sc	Vv	☆				☆			_Solandra nitida_ (Chalice vine)					☆	☆							
EWP	HH	Sc	M-V	☆				☆			_Solanum* jasminoides_† (Potato vine)		†			☆								
EWP	T	Sc	V-Vv	☆				☆			_S. wendlandi_ (Blue potato vine)						☆							
EWP	HH	Sc	S-M	☆				☆			_Sollya fusiformis_ (Blue bell creeper)						☆							
EWP	H	Sc	V	☆				☆	☆		_Stauntonia hexaphylla_						☆	☆		☆		☆		
EWP	T	Tw	S-M	☆			☆	☆			_Stephanotis floribunda_					☆	☆			☆				
EWP	HH	Sc/Sh	S	☆				☆			_Streptosolen jasminoides_ (_Browallia_)					☆			☆					
EP	HH	Tw	S-M	☆			☆	☆			_Thunbergia* gibsoni_ (Orange glory creeper)					☆	☆	☆	☆					
EWP	HH	Sc	M	☆	☆			☆			_Trachelospermum jasminoides_† (Star jasmine)					☆	☆			☆				
EWP	HH	Tw	S		☆	☆		☆			_Tropaeolum* speciosum_ (Flame creeper)						☆	☆						
A	HH	Tw	S	☆	☆	☆		☆			_T. peregrinum_ (Canary creeper)					☆	☆	☆						
DWP	H	Ten	Vv	☆	☆			☆			_Vitis* amurensis_				☆									
DWP	H	Ten	Vv	☆				☆			_V. vinifera_ (Grape)											☆		☆
EWP	H	Tw	M-V	☆				☆			_Wattakaka sinensis_ (Drega)						☆			☆				
DWP	H	Tw	V-Vv	☆	☆			☆			_Wisteria* sinensis_				☆	☆				☆				

Garden Work for March

March is a rather busy month in the flower garden, when the priority tasks include the sowing down of new lawns, the preparation of new rose beds, and the main planting of bulbs.

Preparation of New Lawns

Thorough preparation of the area is needed previous to the sowing of a new lawn. (See the flower garden notes in the January issue of the "Journal".) If the area is still rough, it should be raked level while the soil is slightly moist and the area should then be consolidated by heeling; that is, by tramping the area consistently with the heels. This shows up any depressions, which can be levelled by raking or by filling. The topsoil should be lightly hoed each week to kill germinating weed seeds and produce a good tilth on the surface.

In southern districts sowing should be completed by the first week in March, but in northern districts conditions are generally better toward the end of the month. The surface inch of soil should be hoed and raked just before sowing. If the soil is at all wet and sticks to the shoes, the ground should be allowed to dry out a little before sowing.

The seed should be divided in two parts; half should be broadcast each way across the area. This gives a more even distribution. After the seed is broadcast a freshly mixed fertiliser application of 2 parts of sulphate of ammonia and 1 part of superphosphate should be given in the same manner at 1oz. per square yard. Both the seed and the fertiliser should then be lightly raked in. If birds are numerous, red lead should be mixed with the seed at 1oz. to 10lb. of seed, or black thread stretched across the area.

Where lawns are being sown under average conditions the following seed mixture should be used for fine-textured ornamental lawns at ½oz. to 1oz. per square yard:—

Browntop, 1 part by weight

Chewings fescue, 2 parts by weight

Where conditions are hot and the soil is sandy 1 part by weight of yarrow or white clover could be added to this mixture to help keep the lawn green over summer.

If grass is being grown to help stabilise steep banks which will probably not be mown, the following coarser mixture will be cheaper yet satisfactory:—

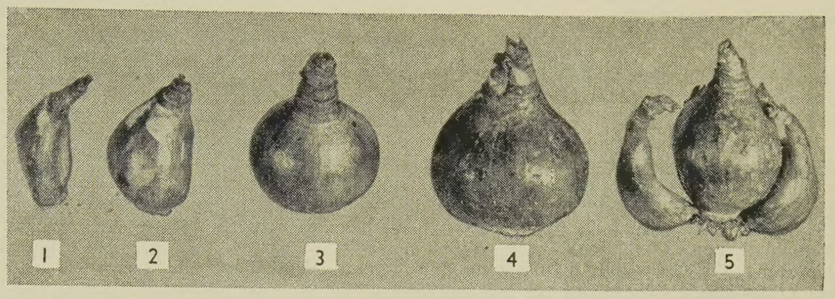
Certified perennial ryegrass, 20 parts by weight

Certified white clover, 4 parts by weight

Certified subterranean clover, 4 parts by weight

Crested dogstail, 4 parts by weight

Sow at 1oz. to 10 square yards and use the normal lawn fertilisers.



Five grades of narcissi bulbs. 1 and 2—"Offsets". 3—Single round. 4—Double nosed. 5—Mother bulb. Single round produces the best flower.

Established Lawns

The regular 3-monthly application of fertilisers should be applied this month, preferably while the dew is on the ground. The mixture of 3 parts by weight of sulphate of ammonia and 1 part by weight of superphosphate should be spread evenly at 1oz. per square yard to avoid patchy burning of the grass.

If heavy wear has caused bare patches in gateways or in other areas of the lawn, the compacted soil should be aerated and worked to a satisfactory tilth for resowing in the same manner as for new lawns. When suitable turf is available it would be preferable for a quick effect to cover the bare areas with turves 2in. thick. They should be fitted into place and loose soil brushed into the crevices. A thorough watering will settle the soil round the turves.

Mixed Border

As the early flowering perennial plants complete their flowering they can be cut back to allow light and air for the later maturing plants. To encourage winter flowers in milder districts antirrhinums, hybrid wallflowers, and marguerites can be cut back hard at this time. Cuttings of marguerites will root very easily now and give a good spring display.

Before frosts come dahlias should be labelled so that desirable plants may be increased next season.

The layers on carnation plants set last December should now be well rooted. They should now be removed from the plants and set in their permanent positions.

Clumps of early flowering perennials such as doronicums, polyanthus, and *Iris susiana* which have become too large may be lifted and divided. Peony plants should be lifted and divided only when flowering and growth of the plants has deteriorated. If this is necessary, March is the best time to carry out the work.

Chrysanthemums

The disbudding of chrysanthemums other than the pompons and Korean types should be continued by rubbing out the side buds as they develop. The side shoots down the stem should be removed also. At this stage if elegant blooms are desired, it may be advisable to make a second tie round the stakes. As the flower heads develop they become very heavy, and the force of wind or the weight of rain drops will bend and break the stems if they do not have sufficient support.

Preparing New Rose Beds

While roses are still blooming a reliable nursery should be visited to choose and order varieties for planting in new beds. This is much more desirable than making a choice from a catalogue or taking what is left over at the end of the planting season.

Where new rose beds are to be made the site should be prepared now so that the bed can consolidate and the incorporated organic matter will have decomposed to a suitable condition before planting time. The soil should be dug to a depth of at least 18in. Every endeavour should be made to obtain a large amount of organic matter to incorporate to this depth.

As rose beds usually remain for many years, it is imperative that large quantities of material such as spent hops, animal manures, peat, or leaf-mould are incorporated during the initial soil preparation to maintain the physical structure of the soil over the years. This organic matter, as well as improving general fertility, will help break up heavy soils, thus assisting drainage, and it will improve the water-holding capacity of sandy soils.

If desired, edgings of violas or pansies may now be planted in the rose beds. These plants will be well established by the time the roses are planted and make a good display in late spring.

Care of Shrub Plants

If the bark still lifts readily, budding of roses, prunus, and lilac can be continued. If the buds set earlier are

FLOWER GARDEN . . .

swelling and appear to have taken, the ties should be cut so that the bud does not become strangled.

If it is intended to transplant established trees or large shrubs this season, a start should be made on preparation for this move by partial wrenching. This entails digging to a depth of 2ft. round one half of the tree at a distance of between 2ft. to 3ft. from the main stem, depending on the size of the plant. The trench thus made should be filled in so that new fibrous roots will develop. The other side of the plant can be similarly wrenched next month.

Weak hydrangea shoots should be removed now so that the strong new shoots have sufficient light and air to develop properly. Where new shoots are plentiful the older shoots should be removed entirely after flowering. If sufficient new shoots have not developed, at least some of the shoots which flowered should be shortened to a pair of buds now, so that these will develop into next season's flower buds.

Bulb Planting

Most gardens grow a range of spring flowering bulbs, and to ensure a good display planting should be done this month. Most bulbs should be planted with their tops about twice the diameter of the bulb below the surface; on heavy soils they may be a little shallower and in light sandy soils a little deeper. Tulips may be planted deeper than this where they can be left in the bed for several years. Daffodils, tulips, and hyacinths should be planted 3in. to 6in. apart. Bulbs cannot be expected to do well on a poorly drained soil, as their roots will die if the soil becomes waterlogged. A site likely to lie very wet in winter should not be planted with bulbs unless it can be drained.

Ranunculus, anemones, and hyacinths make bright masses of colour when planted separately, ranunculus and anemones giving a prolonged display. Tulips and daffodils can effectively be interplanted with forget-me-nots as a ground cover.

Bulbous iris, tulips, and hyacinths benefit from a dressing of lime, and equal quantities of blood and bone and superphosphate should be used at 4oz. per square yard. The main requirement of hyacinths, however, is a soil rich in humus.

The main planting of such lilies as *Lilium bulbiferum* var. *croceum*, *L. henryi*, *L. martagon*, *L. pardalinum*, and *L. umbellatum* should now be carried out. Most lilies like a cool root run in slightly acid soil, and for this reason they grow well when interplanted among shrubs such as azaleas, kalmias, and andromedas. Generous applications of leafmould or sawdust also assist in keeping the roots cool.

Bulbs such as hyacinths can be potted up in suitable containers for flowering indoors. The containers should be placed in a cool, dark place for about 6 to 8 weeks until a good mass of roots has developed. After that they can gradually be watered more freely and brought into a lighter position.

In the Greenhouse

Any necessary repairs should be done to the greenhouse before the cold weather comes. Begonias should be watered carefully as they begin to dry off. Young seedlings of primula and cyclamen or rooted cuttings of balsams, fuchsias, geraniums, or calceolarias may be potted up now for winter and spring flowering.

Chrysanthemums which have been growing outside in pots during the summer may be brought into the greenhouse when their colour is showing well.

General

Biennials such as wallflowers should be wrenched ready for planting out next month by thrusting the spade on each side of the plant, 6in. from the stem, to break the taproots.

Seed of hardy plants can still be sown outside. These include calendula, viscaria, and Iceland poppy. Earlier sowings should be thinned out as they develop. In warmer districts antirrhinums, larkspur, scabious, and Russell lupins can be sown.

Trenches for sweet peas are worth the effort involved, except on very good soils, and can be made now, high-quality organic matter being incorporated. The colour range and blooming of the multiflora strain of sweet peas have proved disappointing, though the stems are excellent. Lifting of gladiolus should be continued, and they should be dried off in an airy position. Bulbs which have given washy colours and disappointing blooms should be discarded immediately.

Violets for winter flowers in the colder districts can be protected with frame lights or cloches.

If a number of pot plants is grown, turf should be stacked in a heap for future use. A slice 4in. deep should be taken from the top of a fertile pasture and stacked until spring, when the grass and clover have decomposed.

All available healthy plant material should be put on the compost heap and earlier heaps can be turned, the outside material being put into the centre of the new heap.

Cuttings of border plants such as nepeta, pentstemon, viola, pansy, dianthus, verbena, and calceolaria can be taken to ensure good plants for next season; these should be placed in a protected spot outdoors or in a frame.

Echeverias can be divided and replanted now.

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Pest and Disease Control of Violets

An experiment to control leaf spot (*Phyllosticta violae*) and red mite (*Tetranychus* sp.) on violets grown commercially near Christchurch by fortnightly applications of a dust of 10 per cent. captan and 5 per cent. malathion has given satisfactory results. There was also better development of the plants and earlier flowering.

The experiment, started in January 1957, was conducted by the Horticulture Division of the Department of Agriculture, Christchurch, in co-operation with a commercial violet grower in the cut-flower growing area of the Port Hills.

Six rows, each of 26 plants, part of a block of recently set out plants, were selected for treatment. All plants on the property were affected with leaf spot and red mite and had been sprayed with thiram and chlorobenzide 20 days before the experiment started; badly affected leaves had been removed.

No untreated plants were available as control, so a check was made against the remainder of the block, which the grower treated with a combination spray of thiram and chlorobenzide every 3 weeks.

Plants in the experimental plot were given 7 dustings involving 5½lb. of material, a small fan blower being used for the treatments.

Dusted plants soon showed superiority over the rest of the block. After a month there was widespread infection of leaf spot on the check plants, whereas it was insignificant on the trial plot, better growth being a result.

Flowering began a fortnight earlier on the dusted plants than on the remainder and no damage to the flowers resulted from the dust, such as had been observed when malathion was used as a spray.

During the trial the grower removed badly affected leaves from all plants, which made comparison difficult. As the dusted plants developed so much better, runners were allowed to form on these. The trial was ended early in April when the grower began propagating the plants, taking all his material for next season's plants from the dusted section.

—*K. H. MARCUSSEN, Horticulturist,*
Department of Agriculture, Christchurch

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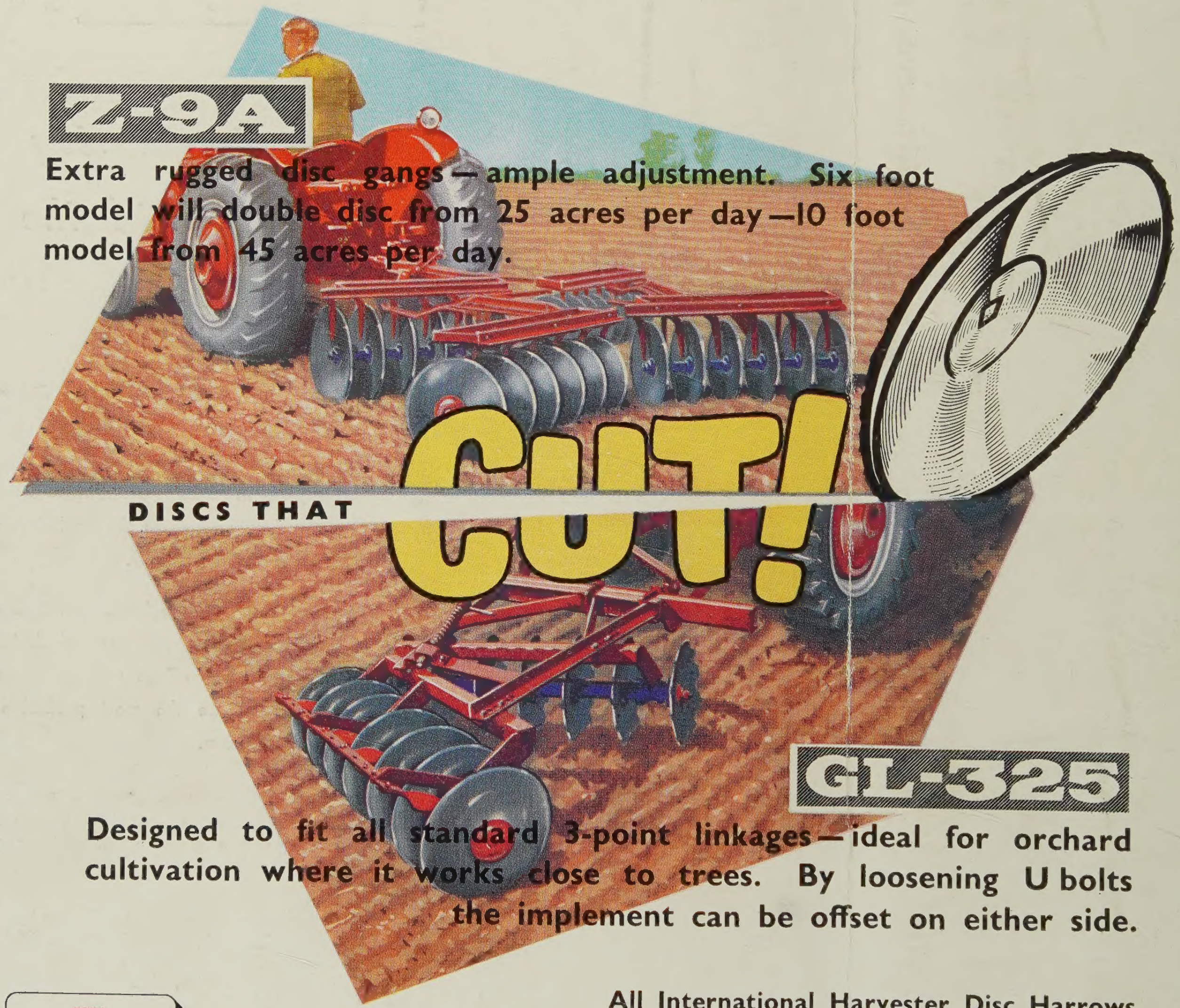

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